Transportation Library

AUGUST 28, 1937

SEP 8 1937

Railway Age

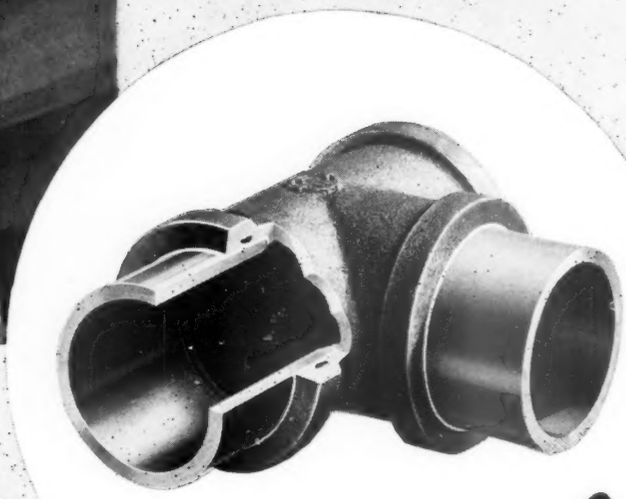
Founded in 1856

TRANSPORTATION LIBRARY

Modern Equipment

Notable among the railways' increased equipment purchases have been the orders placed for modern passenger equipment. In the first seven months of this year passenger-train car orders totaled 470, an increase of 289 over the corresponding period of 1936, and actually more than was ordered in the entire 12 months of each year since 1930. Among the latest equipment to be delivered are the Rock Island's "Rockets", described in this issue.

YOUR PIPING!



Run it easier... quicker... and leak-proof... with Walseal

In ever-increasing numbers the swing is towards Walseal Fittings and Valves for the brass or copper pipe line. Users know that a Walseal joint is stronger than the pipe itself. This modern joint cannot creep . . . cannot pull apart under any temperature to which the pipe can safely be subjected. Vibration cannot affect it.

Thin wall copper tubing, iron pipe size, standard or extra-heavy brass pipe can be used as demanded. The proper brazing alloy is part of each fitting in the amount required. When the Silver Walseal Ring appears around the pipe a perfect joint has been made.

Write for complete information.

WALWORTH

VALVES FITTINGS and TOOLS
Backed by 95 Years' Service

WALWORTH COMPANY
60 EAST 42nd STREET, NEW YORK

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Published weekly by Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter, January 4, 1933, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879. Subscription price, $6.00 for one year U. S. and Canada. Single copies, 25 cents each. Vol. 103, No. 9.

Published every Saturday by the Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa., with editorial and executive offices: 30 Church Street, New York, N. Y., and 105 West Adams Street, Chicago, Ill.

SAMUEL O. DUNN, *Chairman of Board*
HENRY LEE, *President*
LUCIUS B. SHERMAN, *Vice-Pres.*
CECIL R. MILLS, *Vice-Pres.*
ROY V. WRIGHT, *Vice-Pres. and Sec.*
FREDERICK H. THOMPSON, *Vice-Pres.*
ELMER T. HOWSON, *Vice-Pres.*
F. C. KOCH, *Vice-Pres.*
JOHN T. DEMOTT, *Treas.*

CLEVELAND
Terminal Tower

WASHINGTON
1081 National Press Building

SEATTLE
1038 Henry Building

SAN FRANCISCO
485 California Street

LOS ANGELES
Union Bank Building

Editorial Staff
SAMUEL O. DUNN, *Editor*
ROY V. WRIGHT, *Managing Editor*
ELMER T. HOWSON, *Western Editor*
JAMES G. LYNE, *Assistant to Editor*

C. B. PECK
W. S. LACHER
ALFRED G. OEHLER
F. W. KRAEGER
E. L. WOODWARD
J. H. DUNN
D. A. STEEL
R. A. DOSTER
H. C. WILCOX
NEAL D. HOWARD
CHARLES LAYNG
GEORGE E. BOYD
WALTER J. TAFT
M. H. DICK
W. J. HARGEST
E. J. PHILLIPS
JOHN H. KING
W. H. SCHMIDT

The Railway Age is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

Subscriptions, including 52 regular weekly issues, and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free. United States, U. S. possessions and Canada: 1 year, $6.00; 2 years, $10.00; foreign countries, not including daily editions: 1 year, $8.00; 2 years, $14.00.

Single copies, 25 cents each.

H. E. McCandless, Circulation Manager, 30 Church St., New York, N. Y.

Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name registered U. S. Patent Office.

Vol. 103 August 28, 1937 No. 9

In This Issue

Rock Island Places New Trains in High-Speed Service . . . . Page 256

An article describing the first of this road's six "Rockets" which will average 70 m.p.h. and cut time between Kansas City and the Twin Cities about two hours.

Difficult Problems Solved in Relocating Inundated Line 267

Tells how flooding of Baltimore & Ohio Branch in Tygart River Valley in West Virginia by Federal dam project necessitated building new 12-mile railway through rolling country at large expense.

Electrification at Commercial Frequencies 273

An article by Ludwig F. Roehmann, Electrical Engineer of New York City, which tells how European experience indicates the possibility of further developing the single-phase motor.

Burlington Trucks Make Their Schedules Safely 279

A Motor Transport Section article showing how consistent runs, rather than spurts and delays, produce excellent on-time record and prevent accidents.

EDITORIALS

A Railway Crisis and Its Causes 253
Distant Aspect for Train-Order Signal 254

GENERAL ARTICLES

Rock Island Places New Trains in High-Speed Service 256
Brookings Report on Government Transport Policies 265
Difficult Problems Solved in Relocating Inundated Line 267
British Rate Increase Is Double Wage Rise Award 272
Congress Quits Leaving Little Rail Legislation 272
Electrification at Commercial Frequencies by Ludwig F. Roehmann 273
Unusual Methods Mark Pennsylvania Supply Work 276

MOTOR TRANSPORT SECTION

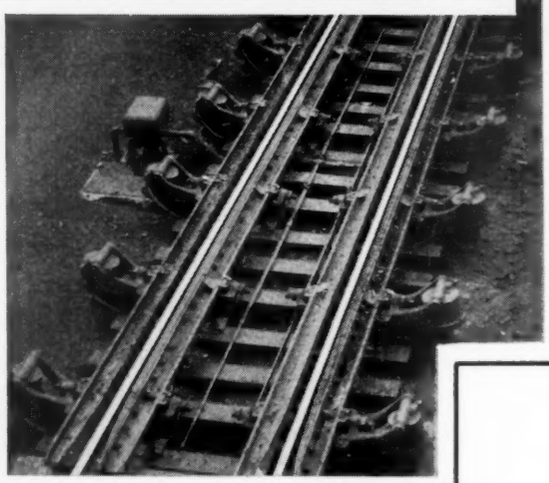
Burlington Trucks Make Their Schedules Safely 279
Motor Transport Outlined in Annual Reports 282
M. K. T. Shop Busses 285
Bus Group Issues Statistics 285
Safe Driving 285

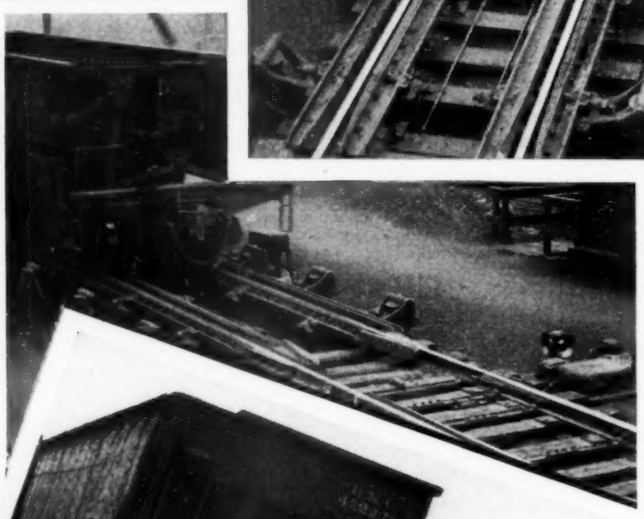
NEWS 286

FREIGHT OPERATING STATISTICS 295

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

Yards are not designed to Hold cars!





MODEL 31

"A yard is not a place in which to hold or store cars, but rather a place to receive and dispatch cars in trains with the least possible delay. An empty yard is no longer regarded as evidence of slack business; on the contrary, it is an indication of terminal efficiency." » » » » » » »

From a report presented at the A. A. R. Superintendent's Convention at Chicago, June 8, 1937.

THAT'S why the recent tendency has been toward installation of "Union" Electro-Pneumatic Car Retarders! Question their users! They will tell you that a smooth, steady flow of in and out traffic and full use of yard facilities result. Yard operation is speeded up and classification yards become clearing-houses rather than storage tracks. Switching and classifying at other points is eliminated. The savings liquidate the investment in a short time. For example, in one yard the cost per car handled was 56 cents before the retarder installation and 29 cents after.

You may effect similar operating advantages and savings in your classification yards by installing "Union" Electro-Pneumatic Car Retarders. Ask our nearest office for additional data.

1309

1881 **Union Switch & Signal Co.** 1937

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

The Week at a Glance

CARLOADINGS: In the August 14 week freight cars loaded totaled 777 thousand, which was an increase of 5½ per cent over the corresponding week last year.

●

TRUCK TRAFFIC DOWN: The volume of traffic moving by truck in July was 6.4 per cent lower than in June, according to the index compiled by the American Trucking Associations. Seasonal variation, plant shut-downs for inventories and labor difficulties were blamed by the truckers for the loss of tonnage. July tonnage this year was 3.9 per cent up over July last year, however.

●

"ROCKETS" MAKE BOW: The first of the Rock Island's six new streamlined "Rocket" trains have just completed an exhibition tour and will shortly go into 70-m.p.h. service between Kansas City and the Twin Cities, cutting 2 hours off existing schedules. A complete description of these newest of modern trains is given in an illustrated article herein.

●

NEW LINE IN W. VA.: Most of the new line construction encountered nowadays arises from relocation on account of the federal government's ambitious electric power, navigation and flood control program. One such new line—12.3 miles on the B. & O. in West Virginia—is described in an illustrated article herein; an interesting and expensive (to Uncle Sam) job because of the heavy rolling character of the country.

●

P. R. R. STORES: The detailed description of the stores department practices of the Pennsylvania, begun in our issue of August 21, is concluded in an illustrated article herein.

●

ELECTRIFICATION: Several electrification projects have been completed in Europe which employ ordinary commercial frequencies. An illustrated article herein gives details of some of these installations and explores the possibilities of further development in the use of the single-phase motor for heavy electric traction.

●

Q'S TRUCK SAFETY: The Burlington has systematized its truck operations (over 1,500 route miles) to eliminate "spurts" and delays with the result that it gives consistent on-time performance and has a remarkable safety record. Furthermore, the trucks are making money. An article in the Motor Transport Section in this issue tells the why and the how behind the Q's enviable performance in providing freight service on the highways.

●

ROADS FACE CRISIS: The railroads are facing a financial crisis which, if it is not immediately recognized and dealt with vigorously, will head them straight into government ownership within a short time. The figures giving rise to the present dangerous situation are analyzed in the leading editorial herein. The primary step toward the railways' undoing was taken by the I.C.C. in the reduction of $150,000,000 in rates which it ordered at the beginning of the year. Then, the increase in railway traffic began to dry up until now it is running only 5 per cent ahead of last year. Next came rising material costs, which have nicked the roads to the tune of $100,000,000. Then came an advance in wages of $98,000,000 to non-operating employees. And, as a final blow, the train service unions are demanding a pay increase of $116,000,000 and are backing the train limit bill which would cost the railroads $150,000,000. All in all, the railways have during less than a year suffered a combined reduction in freight revenues and an increase in operating expenses totaling over $600,000,000—almost enough to wipe out the net operating income earned last year.

●

SURVEY OF R. R. TRUCKING: The extent of railway operations on the highways and the earnings and expenses of their highway subsidiaries, as revealed in annual pamphlet reports for 1936, are given in summary form in an article in the Motor Transport Section herein.

●

PETTENGILL TO QUIT: Railroads and their employees will lose a valued friend in Congress at the end of the present session, Representative Pettengill having announced his intention not to seek re-election. One of the comparatively few legislators willing to study and master the complexities of the freight rate structure and its economic effects, Mr Pettengill will long be remembered for the valiant fight he has made against the iniquitous long-and-short-haul clause which arbitrarily deprives the railroads of the opportunity to compete on equal terms with rival transport agencies.

●

BRITISH WAGE HIKE: The recent wage increase awarded to employees of the British railways was a modest one compared with the concessions made to American railway employees. An article herein draws attention to the fact that the rate increase authorized to the railways simultaneously with the wage rise will be double the increase in wage costs. Faced with a situation in many respects analogous with that of the American roads, the British authorities have taken a much more liberal view toward the claims of railway owners than has yet been manifested in America. Furthermore the British Rates Tribunal is not a lumbering, slow-moving body like our I.C.C. Former Commissioner Woodlock writes from London in the Wall Street Journal calling attention to the short time it required—only 43 days—to reach its decision granting the railways' request for higher rates.

●

PERISHABLE RATES: The I.C.C. has announced a general investigation into charges for the protection of perishables against cold from all points of origin to all destinations. All the railroads and the principal refrigerator lines are respondents, and hearings will begin in January.

M. P. BUSES TO N. O.: The Motor Carrier Division of the I.C.C. has denied authority to the Missouri Pacific Transportation Company to continue bus operation between Natchez, Miss., and New Orleans, leaving Teche Lines (Greyhound affiliate) in sole control of interstate bus service on this route. M. P. T. is affiliated with National Trailways, a competitor of Greyhound on a national scale, and Commissioner Lee dissented to the decision, which shuts Trailways out of New Orleans.

●

CAPITOL LTD. DIESELS: The "Capitol Limited," premier train of the Baltimore & Ohio between Washington and Chicago, is now powered exclusively in both directions by Diesel-electric locomotives—each engine being run through from terminal to terminal without change.

●

CONGRESS WINDS UP: A tired Congress went home for a rest last Saturday night, having enacted little legislation of any importance affecting the railroads (excepting the pension act, which was non-controversial). The menacing train limit bill passed the Senate, however, and other legislation of almost equal importance will be pending when the lawmakers reconvene in January. A survey of the national legislative situation as it affects the railroads is presented in an article herein by *Railway Age's* Washington editor.

●

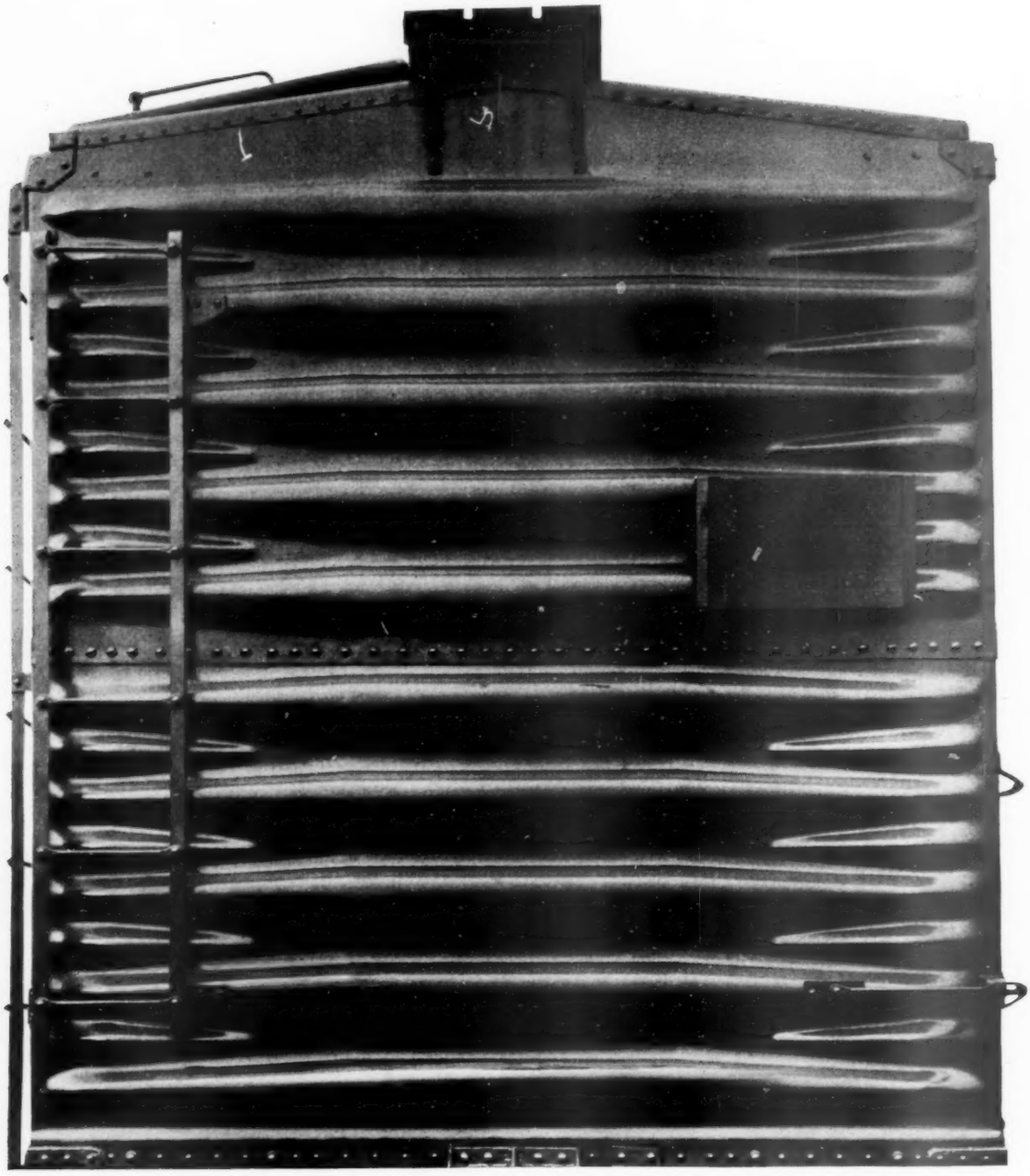
NEW EQUIPMENT: The Pennsylvania this week ordered a light-weight stainless steel dining car from the E. G. Budd Manufacturing Company, and placed in experimental service one of the Pullman Company's new "roomette" cars. The Cambria & Indiana ordered 800 hopper cars and the M. & St. L. placed a contract for two pusher snow plows.

●

REFUSE WAGE RISE: The conference committee of managers, meeting this week in Chicago with the heads of the train and engine service unions, refused to grant the 20 per cent increase in wages demanded by this group, following which A. F. Whitney turned loose a customarily windy statement decrying "exorbitant returns to capital" and ending with the statement that the organizations now have "no alternative" except to walk out.

●

GOVT. IN TRANSPORT: The Brookings Institution has issued a 150-page report surveying the government's activities in behalf of, and in regulation of, various forms of transportation; and favoring the grouping of all promotional activities in one federal department, with regulation concentrated in the I. C. C. Declaring that the government at one time had done much to promote railroad development, the report discloses that promotional activity is now expended mostly for the benefit of the railways' rivals. Among agencies which the report would move to new jurisdiction are the Bureau of Public Roads, the navigation division of the Army Engineers and the Inland Waterways Corporation.



THE RESILIENCY OF THE DREADNAUGHT END HAS CONTRIBUTED MUCH IN REDUCING DAMAGE CLAIMS TO BREAKABLE FREIGHT

RAILWAY AGE

A Railway Crisis And Its Causes

Most of the American people will be startled and incredulous when told that they are faced now with a railway crisis already serious and which may rapidly become extremely serious. Nevertheless it is a fact.

Until recently the public was being told by well-informed persons, including spokesmen of the railways, that the situation of these carriers, while still unsatisfactory, was improving. This was true. But a series of important developments has been occurring during 1937 which has been changing the picture; and they have culminated in a controversy between the railways and their employees in engine and train service the outcome of which has the most important potentialities.

Probably before this editorial is published the controversy mentioned will have reached a stage at which the railway situation will demand a very definite and emphatic manifestation of public sentiment if further developments are to be prevented which would make the danger of destruction of private ownership and operation as real as it ever was. Many will be disposed to say that the railways repeatedly have cried, "Wolf! wolf!" before when it turned out that there was no wolf. As a matter of fact, there was a wolf on several previous occasions, and he was driven away. There is also a wolf now, and it will be highly unsafe for the public complacently to assume there is none and therefore no need for it forcibly to show that it intends to have private operation continued and to prevent things being done that would make its continuance impossible.

A $150,000,000 Reduction of Rates

The series of developments that has produced the present crisis began less than a year ago, and was started by the Interstate Commerce Commission. In 1936 the railways earned a net operating income of $667,000,000, a gain of 33½ per cent over 1935. This was due principally to an increase of about 15 per cent in their freight traffic. Assuming, no doubt, that this increase of traffic would continue, the commission abolished the "emergency" freight charges. It was estimated this would make earnings about $120,000,000 a year less than if these charges had been left in effect. The result of this and other influences has been a reduction thus far this year of about 4.6 per cent in freight rates as measured by average revenue per ton per mile. On the basis of 1936 traffic this decline of rates would have reduced annual freight earnings $152,000,000. The railroads could have stood the reduction of rates if (1) their traffic had increased throughout 1937 as expected and (2) they had had no extraordinary increases in their operating expenses. But their traffic is not now increasing as expected, and they are having extraordinary increases in their operating expenses.

In the first quarter of 1937 their freight loadings increased 15.5 per cent. In the second quarter they increased only 12.9 per cent; in July only 7.2 per cent; and in the first two weeks of August only 5.3 per cent. On the basis of present traffic and rates, it makes a difference of about *$26,000,000 a month* in freight earnings whether freight loadings increase 15 per cent or only 5 per cent.

Increase in Prices, $125,000,000; Proposed Increase in Wages, $200,000,000

Having looked at earnings from the standpoint of both freight rates and freight traffic, let us now take a look at operating expenses and the way they are being affected.

Owing largely to government policies, including passage of the Guffey coal bill, the prices of railway equipment, materials and fuel have increased about 12 per cent within the last year. On the basis of the purchases of equipment, materials and fuel actually made in 1936 this is adding about $125,000,000 annually to railway costs.

Effective on August 1, after negotiations with fourteen labor unions, the railways gave their lower-paid employees an advance of five cents an hour in their wages at an estimated cost of $98,000,000 a year. As previously stated in these columns, this advance was agreed to by the Carriers' Conference Committee of Managers largely because of fear that if the issue was carried to an emergency commission appointed by the President the commission would grant even a larger increase.

The five unions of employees in engine and train service are engaged in a movement for a 20 per cent advance in their wages. The granting of this entire demand would add $116,000,000 a year to operating expenses. The granting of an advance of 8 per cent to the engine and train service employees, which is about what the increase to the other unions averages, would add about $45,000,000 a year to operating expenses. The giving of a flat increase of 5 cents an hour, as in the case of the other unions, would cost more than $30,000,000 a year.

The Carriers' Conference Committee of Managers has refused to agree to any advance to the engine and train employees upon the grounds that they are the

highest paid of all classes of railway employees; that they are still relatively much higher paid in proportion to the hours they work than other employees; that most railways are in such bad financial condition they could not stand to make a further increase in wages unless given a substantial increase in rates; and that, in view of the attitude of the Interstate Commerce Commission regarding the emergency freight charges, and of the competition to which the railways are subject, it is wholly uncertain whether they could get an advance in rates that would yield revenues even approaching their increased needs.

Train Limit Legislation to Increase Annual Expenses $150,000,000

Finally, the United States Senate at its recent session passed, and there is now pending before the House, a bill to limit the length of freight trains to 70 cars, which, it is estimated, would increase the annual operating expenses of the railways at least $150,000,000. It is very pertinent, in view of the current controversy with the engine and train service brotherhoods, to emphasize that this and other kinds of legislation greatly to increase operating expenses are being promoted by these same brotherhoods.

There are other causes of the railway crisis which is developing, but the foregoing are the most important, and are surely sufficient to demonstrate its reality. Add together an annual *loss* of $150,000,000 in freight revenues due to the reduction of almost 5 per cent in average revenue ton per mile; and annual *increases* in expenses of $125,000,000 due to advances in prices; of $98,000,000 due to the 5 cents an hour increase in wages granted to fourteen classes of employees; of $116,000,000, the advance in wages demanded by the engine and train service brotherhoods; and of $150,000,000 that would be caused by the proposed train limit legislation—and we have a combined *reduction* of freight revenues and *increase* in operating expenses of $639,000,000.

In the absence of increased earnings due to increased traffic this would wipe out the equivalent of 95 per cent of the $667,000,000 net operating income earned in 1936; and, as already shown, the increase of freight traffic has decelerated during the last three months to about 5 per cent.

Railway Bankruptcy—Government Operation—Does the Public Want Them?

The annual fixed charges of the railway industry exceed $500,000,000, and the great bulk of them must be paid, if paid at all, out of the net operating income earned. Each railway company must pay its fixed charges or become bankrupt. One-third of all the country's mileage actually is bankrupt now, and the reduction of net operating income that would be caused by the developments that already have occurred this year and the additional increases in operating expenses that would be caused by the further advances in wages and the legislation that the leaders of the train service brotherhoods are seeking would bankrupt most of the companies that are still solvent. Many railways would become unable to pay even their operating expenses, much less their fixed charges.

Bankruptcy of numerous or most railways obviously would stop the progress they have been making in improving their service, and even arrest their acquisition of additional equipment required to handle traffic if it continues to increase. Private ownership and management could not continue to conduct a bankrupt railway system without the assistance of loans of the taxpayers' money made by the government; and future loans to most railways would have to be made on little or no security.

What this plainly means is that, unless the series of developments now rapidly tending to bankrupt virtually the entire railway system of the United States is immediately arrested, the American people may suddenly awaken to a realization that government ownership and operation of railways have become almost or actually unavoidable.

The crisis does not as yet present a problem insoluble under continued private ownership and management, but it plainly does present a problem imperatively demanding a powerful expression of public sentiment. It is in important respects strikingly similar to the crisis which developed so rapidly in 1917. The public was repeatedly and loudly warned then that developments were swiftly occurring which would, if not arrested, result in government operation. The public ignored these warnings; and it paid dearly during two years of government operation and has paid dearly ever since for having ignored them. It may show similar skepticism and inertia regarding similar warnings now; and it may pay much more dearly for doing so than it has paid for ignoring the warnings given in 1917.

Distant Aspect for Train-Order Signal

At this time, when train speeds are being increased so markedly, the question arises whether the automatic block signal in approach to a train-order signal should be so controlled by the train-order signal that the automatic signal will display a distant signal aspect when the train-order board is displaying an aspect indicating that orders are to be picked up by an approaching train.

Prior to the installation of automatic signals, some roads left the train-order boards normally in the stop position at an open office. As a train approached within view of the office, the engineman would sound a whistle to call for the signal, and, if no orders were to be issued, the operator cleared the board. This practice afforded a check that the operator was on the job and

that the signal was in proper operating condition. Obviously, this entire procedure had to be performed within sighting range of the signal, and, with the speed at which trains are now operated, it became necessary to reduce speed to avoid running by the office in case a stop was required for orders.

Other roads have for years left the order boards normally in the clear position, and some roads changed to this practice when automatic signals were installed. Where this procedure is followed, when a dispatcher calls an operator to issue an order, the operator sets the signal at stop and advises the dispatcher to this effect before the order is transmitted.

However, even with the boards normally at clear, an engineman must approach each open office at a speed that will enable him to stop short of the train-order signal. At locations where the view of the signal is short, or when storms obscure the view, safe operation requires reduced speeds. This situation is further aggravated with higher train speeds, because the braking distance is longer than the sighting range of the train-order signal at many locations. Because of this fact, when centralized traffic control was installed on a section of one road, eliminating the train-order signals, the average speed of those passenger trains which operated through the territory on main track without interference, increased from 47 to 54 m.p.h.

This leads to the thought that, on high-speed lines, each train-order signal should have a distant signal, like any automatic block or interlocking signal. Years ago, certain roads saw the need of distant signals for each train-order signal and arranged the control of the automatic located in approach so that it would display a caution aspect when the order board displayed an aspect indicating that orders were to be picked up. This arrangement has served successfully for many years on several important railroads, including the Erie, the Milwaukee, and the Frisco.

Certain other roads contend that the functions and operation of train-order signals should be kept distinct and apart from that of automatic block signaling. Their contention is that, if the automatic signal is controlled to the caution aspect by either the automatic ahead or the train-order signal at stop, an engineman may become confused in that he may slow down or stop to pick up the orders, and get the impression that he has completed the observance of the caution aspect. While starting or accelerating the train, he may then be so busy reading the orders that he may overlook the next automatic signal, which may be indicating stop owing to a train in the block.

As a means of preventing confusion between automatic and train-order signals, the Milwaukee uses an advance automatic signal at interlockings and certain station layouts, which serves also as a train-order signal, being so designated by a sign reading "Train-Order Signal." Regardless of whether this signal is held at the stop aspect by a train in the block or under the control of the operator as a train-order signal, the engineman must get a clearance from the operator before proceeding. Likewise, the Pennsylvania practice provides that, when an interlocking home signal or a wayside signal at an office is used to display an indication to stop a train, a banner and lantern at a tower window inform the engineman that orders are to be picked up. Thus, in automatic block territory, the automatic signal in approach to the interlocking or wayside signal at an office, in all instances serves as an approach signal.

Numerous arguments can be advanced both for and against the practice of using automatic signals as distant signals for train-order signals, but the point of importance is that, with present train speeds, a distant aspect is needed and serious thought may well be given the problem, in order to overcome the objectionable features in present practice.

Why Railroads Lose Traffic and Employees Their Jobs

Last week the Senate passed a bill which is now up to the House, to limit trains to 70 cars.

We wonder if the wise (?) lawmakers considered the following?

A report by competent engineers that this limitation should be 70 cars and not 71 or 69?

Did the engineers find that all grades were the same and how about the down hill pull? Why not more cars when the trains are going the other way, whichever way that is?

What makes the engineers believe that this country has reached the absolute maximum in engine building efficiency and that we will not build any more engines that will pull longer trains?

What makes the engineers believe the roads will not continue to reduce their grades and straighten their curves?

Why did not the engineers—if there were any—limit the train by total weight? All cars are not loaded with feathers or sand. A trainload of sand might have a car of feathers in it and then it would seem that the railroad should be allowed to make up the difference with more sand. . . .

Undoubtedly, one of the greatest contributors to high railroad costs, as is the case where unions get the upper hand and undertake to run a business, has been these railroad unions. They have their compensations but they get to running wild in these days of political pressure groups where each group looks out for its own and let the devil take the hindmost.

We do not cite this plaint on behalf of the railroads out of any great sympathy for them, because the oil industry is fast getting its products off the rails just because the combination of government and union management of the roads has made transportation costs too high. If the oil industry had left all its gasoline gallonage on the rails Ford and Chevrolet and Plymouth would not be selling anywhere near so many cars today as they are selling in all probability, because of the resulting high price for gasoline. . . .

—From an Editorial in the National Petroleum News

Rock Island Places New Trains in High-Speed Service

First of six 'Rockets" will average 70 m.p.h. and cut time between Kansas City and the Twin Cities about two hours

THE first two of six new streamline Rocket trains of the Chicago, Rock Island & Pacific have just completed an extensive exhibition tour and will be placed in service shortly between Kansas City, Mo., and St. Paul-Minneapolis, Minn.

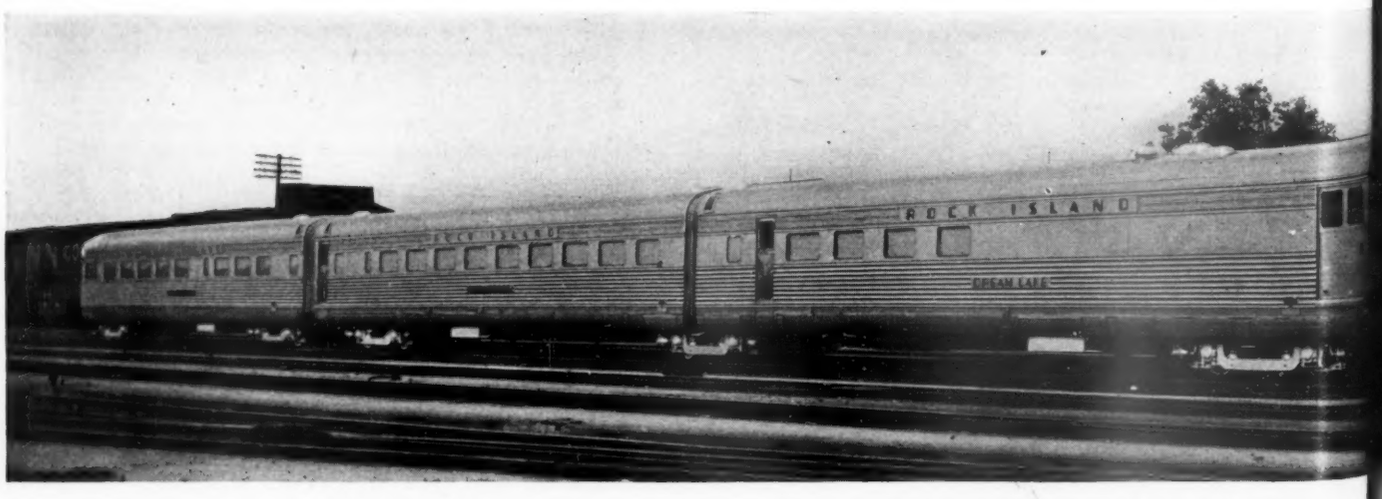
Four of the trains, including the two which have been on exhibition, consist of three partially articulated stainless-steel body units each; the remaining two have four body units each. Each of the six trains will be hauled by a 1,200-hp. Diesel-electric locomotive capable of making 117 m.p.h. The cars are the product of the Edward G. Budd Manufacturing Company, Philadelphia, Pa., and the Diesel locomotives are being delivered by the Electro-Motive Corporation, La Grange, Ill., a subsidiary of General Motors.

Two of the three-unit trains will operate daily between Kansas City and the Twin Cities; one three-unit train, between Kansas City and Denver, Colo.; one four-unit train, between Chicago and Peoria, Ill., two round trips daily; one four-unit train between Chicago and Des Moines, Iowa, one round trip daily, and one three-unit train between Forth Worth-Dallas, Tex., and Houston, providing daily streamline service between North and South Texas. The average speed of these trains, when placed on regular schedule this month, will be about 70 m.p.h., reducing the running time of the present service, in some cases, by about two hours between terminals.

All Rocket trains are daylight trains, with no sleeping accommodations, and are designed for commercial service without extra fare. They are air-conditioned throughout and have Automatic telephone communication from the engine cab to the observation car. The name "Rocket" applied to these streamline trains is a perpetuation of the name given the first passenger train to operate over the Rock Island out of Chicago in 1852. The name also suggests speed as well as the name of the railroad itself.

The Passenger Cars

The three-unit trains are identical, except for decorative treatment, as are also the two four-unit trains. The first body unit of the four-unit train contains a



First of Six Rocket Diesel-Driven Trains Placed

baggage room at the front, a kitchen and pantry, and, at the rear, a 32-passenger dinette. Following this is a 60-passenger coach unit and a 76-passenger coach unit. These three units are articulated to form a single vehicle. The fourth unit at the rear of the train is a separate car. At the front end is a 12-passenger lounge and a five-passenger drawing-room lounge. At the rear is a 24-passenger observation-lounge, at the front end of which is a quarter-circle bar.

The first unit of the three-unit train has the same general arrangement of floor space as that on the four-unit train. It differs, however, in that the dinette seats 24 passengers, with coach seats at the rear for eight passengers. The second unit on the three-car train is a 76-passenger coach, the same as the third unit of the four-unit train. These two units are articulated to form a single vehicle. The third unit on these trains is a separate car which differs from that at the rear of the four-unit trains in that the front compartment seats 28 coach passengers. The observation-lounge and bar at the rear end are identical in arrangement on all of the cars.

The cars are fabricated of 18-8 stainless steel by the Budd Shotweld process. The physical characteristics of this alloy are governed by the degree of cold working to which it is subjected; and that used in the construction of these trains is worked to develop either 100,000 lb. or 150,000 lb. per sq. in. tensile strength. Stainless steel of the former strength is used where ductility or special finish is required, and that of the latter strength wherever high strength and low weight are required.

The end sills at the articulated joints are made of cast nickel steel properly heat treated and rivetted to reinforced stainless-steel members; body bolsters and needle beams are made of Cromansil, arc-welded and stress-relieved before attachment to reinforced structural members. Except for the foregoing, carbon steel is employed only in non-structural parts, such as certain partitions, doors, etc.

Interiors of the Trains

The baggage space at the forward end of the first body unit in all of the trains is 17 ft. ⅞ in. long. This compartment is fitted with a sliding five-foot door on each side and an end door. The sliding doors are of stainless steel construction and are fitted to tracks of special design which permit the doors to move from a flush closed position to an open position inside the car body. The end door is also of stainless steel construction, but it is of hinged design. The floor of this section is tongue-and-groove maple between the side doors and in the center aisle strip; at both sides from the rear edge of the door to the kitchen-baggage partition the flooring is open slat work laid on stainless-steel drain pans. The inside lining is corrugated galvanized steel painted buff and the ceiling is sheet aluminum painted white. Hand rails and miscellaneous hardware are finished in black.

Back of the baggage compartment is the kitchen-pantry section. The location of the kitchen permits using the full width of the car, so the twenty-foot kitchen is a workroom of generous size. The equipment and furnishings have been carefully considered to assure complete food-preparing facilities and ease of cleaning. The cooking range is coal fired and contains a charcoal-burning grill. A steam table is placed adjacent to the range. There are refrigerators for ice cream, cream, milk, meat, poultry and general provisions. There are sinks and large work tables. An item of interest is the lighting in the refrigerators which is operated automatically by opening the doors. All kitchen and pantry equipment is faced with stainless steel with finish known as No. 4.

Accommodations for 32 passengers are provided back of the pantry—in the four-car trains this entire space is fitted for dinette service, and in the three-car trains some of this space is devoted to coach accommodations. The dinette seats are the fixed coach type, set in facing pairs with a removable table between each pair.

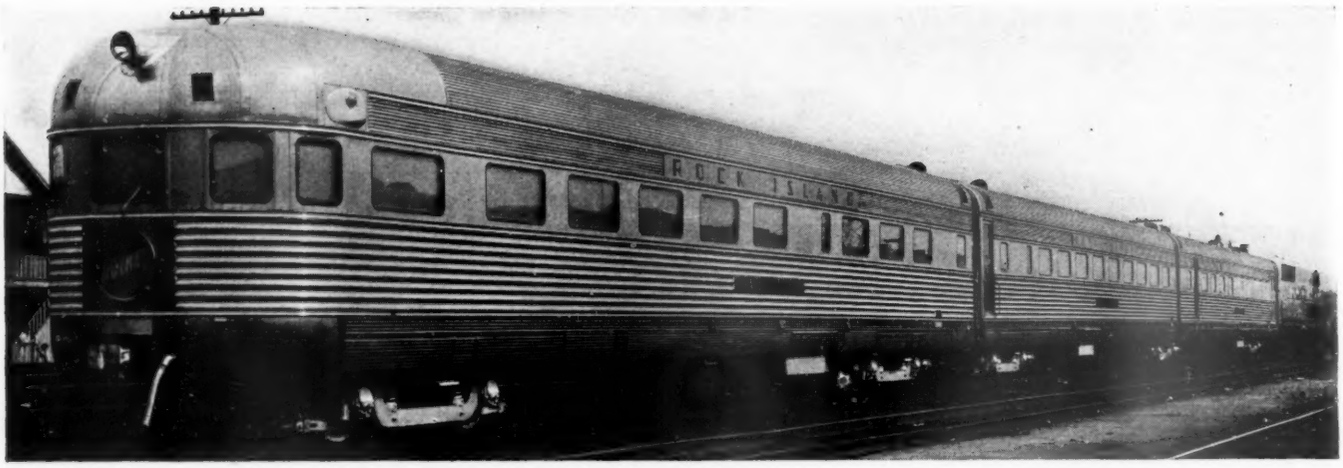
The toilet rooms are placed between the entrance vestibule and the rear end of the car—men's room on the right side and women's room on the left. Each has a pressure-feed porcelain hopper and a vitreous china wash basin.

The interior color scheme of this car is predominantly green. The green carpet on the floor has a light green wavy design, the seat upholstery is a sea-foam green with a checkered figure, the side walls are painted slate green and the ceiling and bag racks are painted gray shale. The general effect is cooling and refreshing. The roller shades harmonize with the general scheme, and the drapes are gold for contrast. Window sills are black. This scheme is carried out in the vestibules and toilet rooms, except for the floor covering which is done in a brown jaspe linoleum in the toilets, and linotile in the vestibule.

The second unit in the four-car trains which is not used in the three-car trains) is a 60-passenger coach with men's and women's toilet rooms on opposite sides of the aisle at the rear of the car. The passenger entrance doors are located forward of the toilet rooms.

The color scheme of this car is built around orchid.

In Service on the Chicago, Rock Island & Pacific



Rear View of One of the Rocket Trains Showing Details of the Stainless-Steel Car Construction

The ceiling (top and sides) is finished in pearl gray, the side walls are painted orchid gray, and the window sills are royal purple. The seat upholstery is a light blue-gray with a small checked figure, the carpet is a deep wine color with white geometric figures, and the drapes are red. The color is relieved by bright metal mouldings on the side and end walls and by the bright metal trim on the seats. The color scheme of the toilet rooms is the same as the coach portion, except for the treatment of the floor which, as in the first car, is Jaspe linoleum.

The third unit of the four-car trains and second unit of the three-car trains are 76-passenger coaches. Passenger entrance doors and vestibule are at the rear end of the car.

The decorative treatment of this car uses a rose color for side walls, a rust colored carpet, another shade of rose for seat upholstery, flesh for ceiling, dull black for window sills, and bright metal trim mouldings and seat trim. The carpet has a wave pattern similar to that of the first car, and the seat upholstery is marked by very small rectangular figures.

The floor plan of the rear car of the four-car trains differs slightly from that of the three-car trains. In the former, the area between the toilet rooms and the bar comprises a 12-passenger lounge with a 5-passenger drawing room, whereas, in the latter, this space is fitted with coach seats for 28 passengers. Two color schemes are employed, each in the cars for two of the three-car trains and one of the four-car trains.

In one scheme the ceilings are peach, with light chocolate side walls and blue carpet with white lines in a geometric figure. The coach seats of the cars for the three-car trains are upholstered in striped blue frieze, and the various pieces of occasional furniture are done in different colors; some are blue, some are turquoise and some are light tan.

In the other decorative treatment the ceilings are blue-gray, with blue side walls and gold carpet with brown lines in geometric design. The coach seats are upholstered in striped brown material, and the various pieces of occasional furniture are done in different colors, some are figured blue, some are brown, and some are gold.

The bar in these cars is of quarter-circle shape and is placed to face the right and rear of the car. The front face is painted to match the inside walls of the car, the counter is genuine mahogany, and the back bar is stainless steel with a mirror and side lights.

In addition to the communication between the rear end of the observation car and the locomotive Automatic telephone service is provided between the bar in the observation-lounge car and the pantry in the kitchen-dinette car of each train. A radio is installed at the front end of each train with a loud speaker in each car.

Body Structure

Fundamentally, the roof and understructure of the car bodies serve as compression and tension chords of a beam. They are connected by Pratt trusses, modified as necessary for doors and windows. The longitudinal mouldings serve to reinforce against localized stresses due to eccentricities. In the vicinity of the door openings which occur between truck centers, the roof is reinforced by application of additional carlines and by flat sheets under the corrugated roof sheets. Reinforcements of this type have proved most efficient in resisting shear at these points.

At the articulated joints, the car body is riveted to an extended center plate made of annealed cast steel in which the side bearings are incorporated. The points of connection are reinforced to permit a satisfactory riveted joint. Vertical loads are withstood by the end truss of the car structure and the bending moment due to inherent articulation eccentricity is resisted by the sill casting which extends into and is attached to a Cromansil needle beam and the stainless-steel center sill; and a vertical beam extending to the roof on either side of the passageway. These vertical beams serve also as anti-telescoping members. The extended attachment of these beams to the roof is designed to withstand the shear developed at the upper end of the beams.

At the front end of the first body, the rear end of 76-passenger body and at both ends of the observation car the under car structure consists of an end underframe made of Cromansil arc welded into a unit and subsequently stress relieved. The design of this unit is such that it serves as body bolster, side bearings, draft-gear housing, end sill and center sill up to the stainless-steel center sill. This member is likewise riveted to the reinforced stainless-steel body structure.

The structural floor in all cars is stainless steel formed to a corrugated cross section and fastened to the car body by the Shotweld process. The valleys of the corrugations are filled with cork strips of the proper cross section to fill these spaces completely. The strips are secured by a cold mastic, are then finished flush with the tops of the corrugations and covered with a ¾-inch layer of cork board to form a base for the carpet. The cork board is sanded smooth and varnished before the application of the carpet. In the baggage room, kitchen, and

in the bar, stainless steel pans properly fitted with drains are applied directly over the structural floor and in these pans are laid wood racks. In this manner, free drainage and a dry standing space is assured.

The insulation used in these cars is a fire and vermin-resisting and water-repellent processed wood-pulp material, which is fitted between the inner and outer walls of the car, between the roof and the ceiling, and in all voids occurring in the structure of the car. The same material in a 2-inch thickness is applied underneath the corrugated floor of the car and is protected on the underside by thin sheets of stainless steel attached to the car structure.

The insulation in the baggage room is navy type Alfol applied in six layers.

The outside doors of these trains are built of stainless steel and are so designed as to be nearly flush when closed. The passenger doors are split at the belt rail to permit the upper half to be opened independently of the lower half. The passenger steps are mounted on an axis and are connected with the trap door so that raising or opening the trap causes the steps to drop into position for use. The step treads are specially punched stainless steel to assure firm footing regardless of weather conditions.

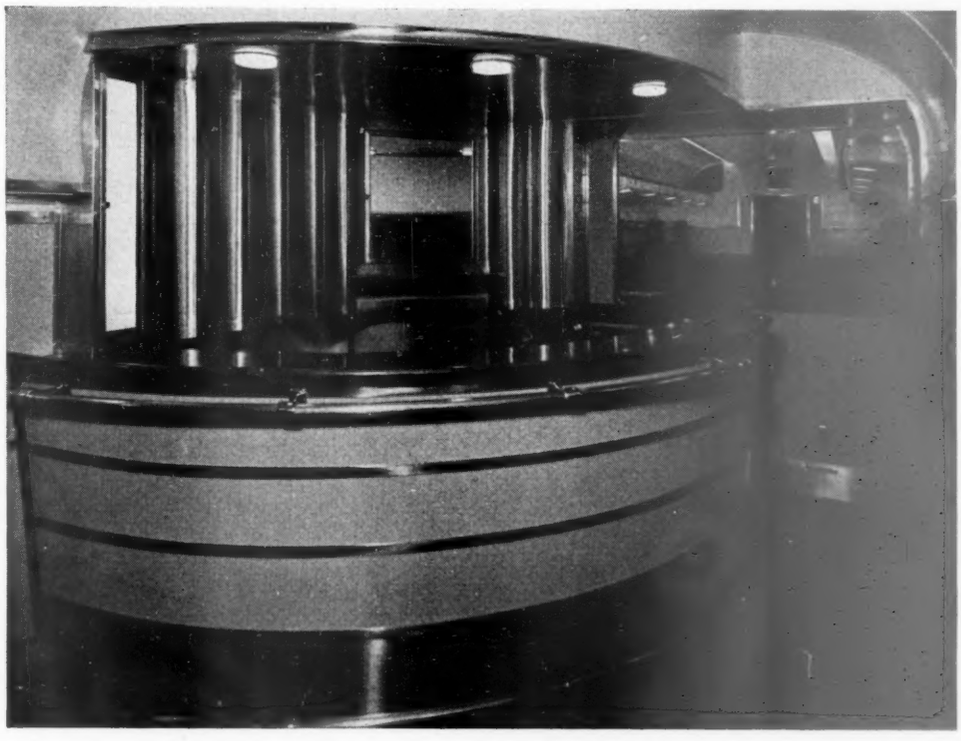
The interior doors are all-metal construction and pivot hinged to preclude danger of pinching passengers' fingers.

The Coach Interior

Lighting

The car windows are very large, each accommodating two seats. They are double glazed with a fixed outer sash of polished plate glass and a hinged inner sash of shatterproof glass. The glass is set in rubber to provide suitable cushioning against vibration and shock and also to weatherproof the car. The hinged inner sash is of special Budd design and hinges at the top. Locks are provided to clamp the sash in its closed position and effectively to seal the space between the sash from dust. Heat loss through windows is reduced to a minimum because of the double-glazed construction. This factor is of great importance where windows are so large and efficient heating or cooling is desired.

The electrical system operates at 64 volts. The batteries are charged by axle-driven generators as a source of power. The lighting in the passenger coaches is overhead indirect, augmented by overhead direct lighting. The indirect system comprises a pair of ducts in the ceiling in which are concealed 25-watt lamps. The direct lighting system comprises overhead fixtures mounted in the underside of the bag racks. The light circuits are



Looking Toward the Front of the Observation-Lounge Car from the Quarter-Circle Bar

The Dinette as Seen from the Kitchen

controlled by switches adjoining the equipment locker of each car, but the direct lights are also fitted with a control switch in the fixture so the passenger has control of the light over his seat.

The lighting of the observation-lounge is also a combination of direct and indirect lighting, but the fixtures are of different design. The overhead indirect lighting comprises a center lighting duct made of extruded aluminum in which the lamps are placed. The direct lighting is furnished by lamps mounted between the side wall of the car and the inside lining. These lights are placed in a cove directly above the windows; this cove is so designed that light shines only through the underside, which is fitted with pebbled frosted glass.

The lighting in the baggage car is conventional overhead lighting with an additional light over each side door. The lighting of the kitchen is provided by ceiling fixtures and lights in the canopy over the range. The lighting in the vestibules, toilet rooms, and aisles between toilet rooms are ceiling mounted fixtures of the dome type.

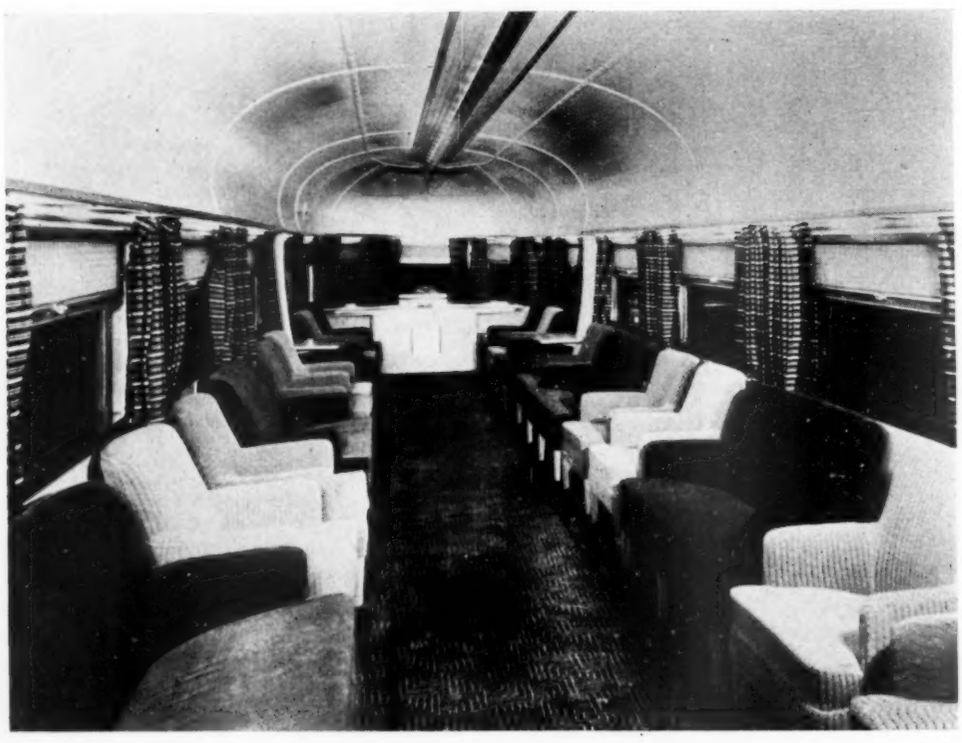
At the rear of the train, a back-up light is provided which is built into the car roof. This light is controlled from the back-up control unit located in the rear table of the observation-lounge. Marker lights are also built into the car roof, which show to the rear and to the side. They show regulation colors and are changed readily from the inside of the observation-lounge. A large illuminated medallion is placed on the rear of the observation-lounge car between the belt rail and the skid rail.

Under each car body is a Safety body-hung generator of 20 kw. capacity, axle-driven through a Spicer drive. The generator system is protected by a safety clutch. The generator mounting is of special Budd design which effectively eliminates the transmission of vibration to the car body. Gould 600-amp.-hr. 64-volt lead batteries are carried in stainless-steel battery boxes mounted beneath the floor of each body unit. The battery is of the Monobloc type with four cells in each bloc or tray. This construction effected an appreciable reduction in the weight and size of the battery.

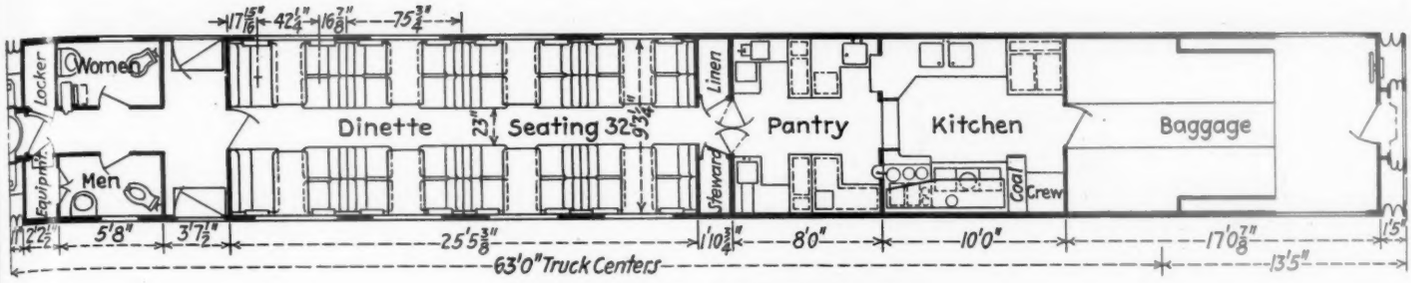
Air Conditioning

The air conditioning equipment is the Airtemp electro-mechanical with electrically driven compressors and condensers mounted beneath the floor of the cars and with overhead thermostatically controlled combination cooling and heating units and blowers.

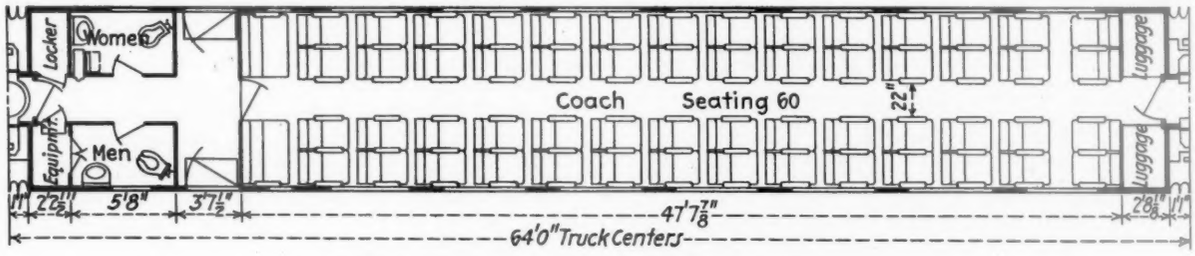
The air distribution is accomplished by overhead ducts, which, in the coaches, extend between the two overhead



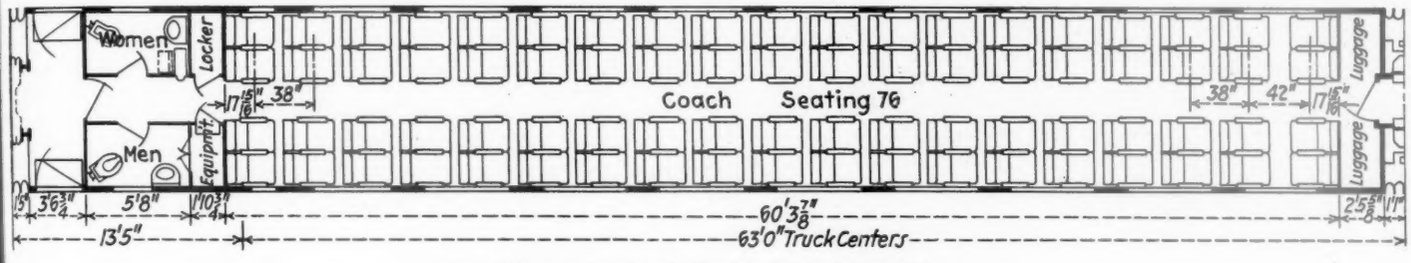
The Furniture in the Observation-Lounge Is Upholstered in a Variety of Patterns



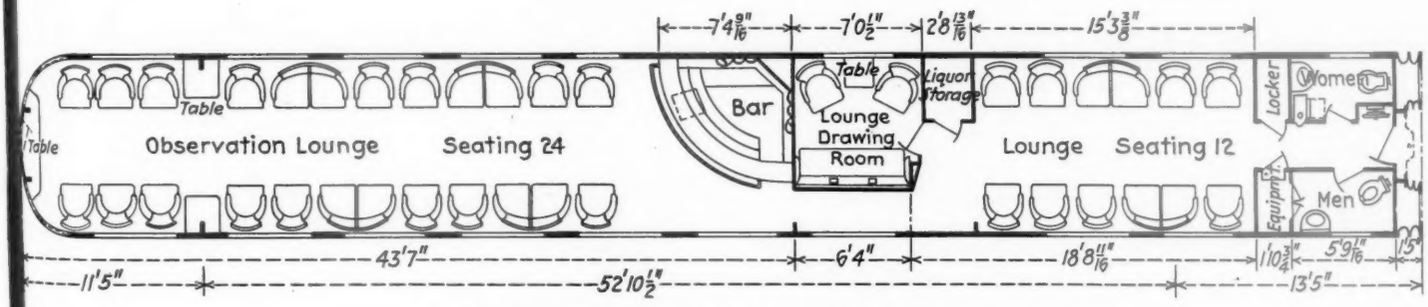
The Kitchen-Dinette of the Four-Unit Train



The 60-Passenger Coach Used Only in the Four-Unit Trains



The 76-Passenger Coach Used in Each of the Trains



The Observation-Lounge Car of the Four-Unit Trains

indirect lighting ducts. Delivery of the air is made through a narrow slot between the bottom of the light duct and the extended underside of the air duct. The ducts are provided with fans and other means for controlling the delivery of the air. Filtered fresh air for the air-conditioning system is taken through openings in the sides of the car roof. The recirculated air, which is taken from the car body and reconditioned, is filtered before it is mixed with the fresh air. The overhead air-conditioning unit contains heating coils for heating the air during the winter. The heating system is also thermostatically controlled and is made to operate in conjunction with the fin-tube type wall radiators which are mounted at the base of the side walls.

The ventilation of the kitchen is accomplished by two overhead exhaust ventilators for removing air and an air curtain at the doorway between the pantry and the dinette section which supplies fresh air to the kitchen. The design of this air curtain is such that two thin flat streams of fresh air are blown toward each other from the opposite sides of the door opening. The amount of air delivered by the air curtain is somewhat less than the amount of air exhausted by the overhead ventilators, hence, there is a constant flow of air from the dinette section to the kitchen. The air curtain has proven itself in previous installations to be very efficient; it does not retard movement of attendants, it is invisible, and it prevents the escape of kitchen odors to the dining room.

Braking

The air brakes are Westinghouse Air Brake Company's electro-pneumatic modified H.S.C. equipment with a braking ratio of approximately 240 per cent. The system is fitted with a retardation control which functions at four selected speeds and operates on the locomotive and train independently. The train controller is located in the first car of each train. Control valves in conjunc-

The Car Structure During Erection

tion with magnet valves are located in the baggage compartment, and beneath the floor of the 76-passenger coach and of the observation car. The train signal system is electrically operated and is controlled by signal buttons at vestibules and baggage doors.

The truck brakes are the Simplex unit-cylinder clasp type with 18-in. shoes.

Partial List of Specialties on the Chicago, Rock Island & Pacific "Rockets"

Aluminum	Aluminum Co. of America, Pittsburgh, Pa. Bohn Aluminum & Brass Corp., Detroit, Mich.
Stainless Steel	Sharon Steel Corp., Sharon, Pa. Rustless Iron and Steel Corporation, Baltimore, Md.
Underframes	Clearing Machine Corp., Chicago Cruse-Kemper Co., Ambler, Pa.
Needle beams	Lukens Steel Co., Coatesville, Pa.
Wheels and axles	Bethlehem Steel Co., Bethlehem, Pa.
Body center plates	Crucible Steel Co. of America, Pittsburgh, Pa.
Castings	Thomas Devlin Mfg. Co., West Burlington, N. I. Deemer Steel Casting Co., New Castle, Del. Lebanon Steel Foundry, Lebanon, Pa.
Journal boxes	Timken Roller Bearing Co., Canton, Ohio
Sill castings	General Steel Castings Corp., Eddystone, Pa.
Simplex unit cylinder clasp brakes	American Steel Foundries, Chicago
Brakes	National Brake Co., Buffalo, N. Y.
Brake shoes	American Brake Shoe & Foundry Co, New York
Brake equipment	Westinghouse Air Brake Company, Wilmerding, Pa.
Springs	American Locomotive Co., Railway Steel Spring Div., New York
Buffer springs	Union Metal Products Co., Chicago
Couplers (rear end)	McConway & Torley Co., Pittsburgh, Pa.
Couplers (tight-lock)	Ohio Brass Co., Mansfield, Ohio
Draft gears	W. H. Miner, Inc., Chicago
Side bearings	A. Stucki Co., Pittsburgh, Pa.
Truck forgings	Camden Forge Co., Camden, N. J.
Miscellaneous hardware	H. S. Getty & Co., Inc., Philadelphia, Pa. Lehigh Foundries, Inc., Easton, Pa. Glynn-Johnson Corp., Chicago
Shock absorbers	Houde Engineering Corp., Buffalo, N. Y.
Air conditioning equipment	Airtemp, Inc., Detroit, Mich.
Compressor drive V-cog belts	Dayton Rubber Mfg. Co., Dayton, Ohio
Filters	American Air Filter Co., Inc., Louisville, Ky.
Interior grilles	Hart & Cooley Mfg. Co., Chicago
Exterior air grilles	Tuttle & Bailey, Inc., New Britain, Conn.
Exhaust fans	B. F. Sturtevant Co., Inc., Hyde Park, Boston, Mass.
Batteries	Gould Storage Battery Corp., Depew, N. Y.
Generator and drive	Safety Car Heating & Lighting Co., New York
Bag rack light fixtures	Adams & Westlake Co., Chicago
Telephones	Automatic Electric Co., Chicago
Ceiling light fixtures	Luminator, Inc., Chicago
Kitchen and baggage-room lighting fixtures	Pyle National Co., Chicago
Plugs and receptacles	Pyle National Co., Chicago
Radio units and cable	International Business Machines Corp., New York
Wire and cable	General Electric Company, Schenectady, N. Y.
Heating equipment	Vapor Car Heating Co., Inc., Chicago
Insulation:	
Baggage room	Alfol Insulation Co., New York
Pipe covering (Hair felt)	Johns-Manville Corporation, New York
Passenger cars (Kimsul)	Kimberly-Clark Corp., Neenah, Wis.
Steam pipe (Wovenstone)	Union Asbestos & Rubber Co., Chicago
Felt	Fidelity Felt Co., Philadelphia, Pa.
Asbestos board	Keasbey & Mattison Co., Ambler, Pa.
Sound deadening cushions for trucks	Crown Cork & Seal Co., Baltimore, Md. U. S. Rubber Products, Inc., Passaic, N. J.
	Fabreeka Products Co., Inc., Boston, Mass.
Cushioning pads to support brake rods	Norristown Magnesia & Asbestos Co., Boston, Mass.
Presdwood	Masonite Corp., Chicago
Agasote	Pantasote Co., Inc., New York
Center plate liners	Fol-Man Manganese Steel Forge Co., Philadelphia, Pa.
Bar and pantry equipment	Angelo Colonna, Philadelphia, Pa.
Mixers and extractors	Hamilton Beach Co., Racine, Wis.
Table tops	Formica Insulation Co., Inc., Cincinnati, Ohio
Lounge chairs	S. Karpen & Bro., Inc., Chicago
Upholstery	L. C. Chase & Co., Inc., New York
Rubber seats, cushions and arm rests	Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind. Dunlop Tire & Rubber Corp., Buffalo, N. Y.
Drape hardware	Kirsch Co., Sturgis, Mich.
Decalcomanias	National Decalcomania Corp., Philadelphia, Pa.
Aluminum sash	Hunter Sash Co., Flushing, L. I., N. Y.
Glass	Pittsburgh Plate Glass Co., Pittsburgh, Pa. Pressed Prism Plate Glass Co., Chicago
Curtain material	Pantasote Co., Inc., New York
Cork flooring	Armstrong Cork Co., Lancaster, Pa.
Inner diaphragm at articulated joints	B. F. Goodrich Rubber Co., Akron, Ohio
Baggage car hardware	American Chain & Cable Co., Inc., Bridgeport, Conn.
Parts for trap doors	O. M. Edwards Co., Inc., Syracuse, N. Y.
Door closers	Russell & Erwin Mfg., New Britain, Conn.
Door hinges	McKinney Mfg. Co., Pittsburgh, Pa.
Step treads, diaphragms, folding gate assemblies, safety step boxes	Morton Mfg. Co., Muskegon Heights, Mich.
Lavatories	Crane Co., Chicago
Lavatory equipment	Dayton Mfg. Co., Dayton, Ohio
Hoppers	Duner Co., Chicago
Copper piping and fittings	American Radiator Co., New York
Water filters (kitchen)	Tested Appliance Co., Chicago
Drinking water coolers	Henry Giessel Company, Chicago
Drinking cups, Ajax	United States Envelope Co., Springfield, Mass.
Towel dispensers	West Disinfecting Co., Long Island City, N. Y.
Extinguishers and equipment	Pyrene Mfg. Co., Newark, N. J.
Self-Tapping screws	Shakeproof Lock Washer Co., Chicago
Back-up light	Electric Service Supplies Co., Philadelphia, Pa.
Paint, varnish and caulking compound	Dolphin Paint & Varnish Co., Toledo, Ohio

A hand brake is located at the forward end of each baggage compartment and at the forward end of each observation car. These are of the wheel type and operate on the truck adjacent to the brake.

Couplers

The coupler at the forward end of the train is a tight-lock type, made by the Ohio Brass Company. It is not fitted with automatic connectors. Couplings for steam and air are of the manual type. At the rear end of the articulated group and at the forward end of the observation cars, a similar coupler is applied, but at this coupling, automatic connectors are provided. These are

contained in the extension below the coupler and automatically connect steam, air, and electrical circuits.

Trucks

All trucks are double equalized, swing-bolster type, with 35-in. wheels and have 8 ft. 6 in. wheel base. Castings are made of nickel-alloy steel, double annealed and drawn, and equalizer-spring-hanger safety straps, crossbars, and swing hangers are made of steel forgings. The journals throughout are fitted with Timken roller bearings. Trucks are equipped with four hydraulic shock absorbers, each so placed as to dampen the lateral swing action of the bolster. Generous application of special shock-absorbing rubber is made at strategic points to control the transmission of sound and vibration to the car bodies. The four brake cylinders are aluminum.

The total weight, ready for service, of each three-car train is approximately 262,300 lb. The total weight of each four-car train is 330,500 lb. These weights are exclusive of the locomotives.

The 1,200-Hp. Diesel Locomotive

The 1,200-hp. Diesel high-speed passenger locomotive, used on each of the new Rocket trains, is 59 ft. long overall and weighs, with one-half running supplies aboard, approximately 220,000 lb. The fuel tank capacity is 1,020 gal., and under normal operating conditions the locomotive uses slightly less than a gallon of fuel oil per mile at an average speed of 75 miles an hour. In other words, the locomotive can be operated at least 1,000 miles on one tank of fuel.

The locomotive is a single unit, streamlined to the extent that all sharp corners and irregular projections have been eliminated, thus providing smooth-flowing body lines which create a minimum of air turbulence. A strikingly rocket-like appearance is given to the front end of the locomotive by alternate bands of maroon and vermilion, augmented by silver stripes and a wide stainless-steel band.

The locomotive unit houses an EMC 1,200-hp. power plant complete with auxiliaries, battery, air compressor, heating boilers and sufficient fuel and water capacity.

The cab or operator's compartment is located in the forward end, the cab floor being elevated to provide an unobstructed view of both sides of the track. The cab is divorced from the main engine room by an insulated steel partition with doors. An outside entrance door is also provided on each side of the cab. All cab windows and doors are equipped with shatterproof glass. Air-operated windshield wipers, window defrosters, and sun visors are provided on the front windows.

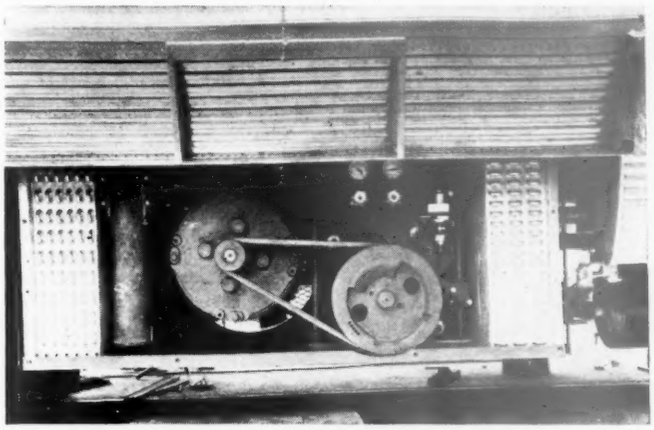
Cab equipment consists of an operator's control station complete with all necessary controls for operating the locomotive, brake valves, sander valve, instrument panels, switches, cab heater, and adjustable upholstered seats for engineman and mechanician. A visual and audible alarm system instantly warns the operator of any abnormal condition in the power plant or running gear.

Back of the cab is the main power plant compartment. Air intake grilles, one on each side of the unit, are located at the rear of the engine compartment and close to the roof line to permit the entrance of clean air to the engine-cooling blower fans. In order to prevent any possible accumulation of snow, moisture or dirt in the high- and low-voltage cabinets, all of this equipment is enclosed in a large steel cabinet.

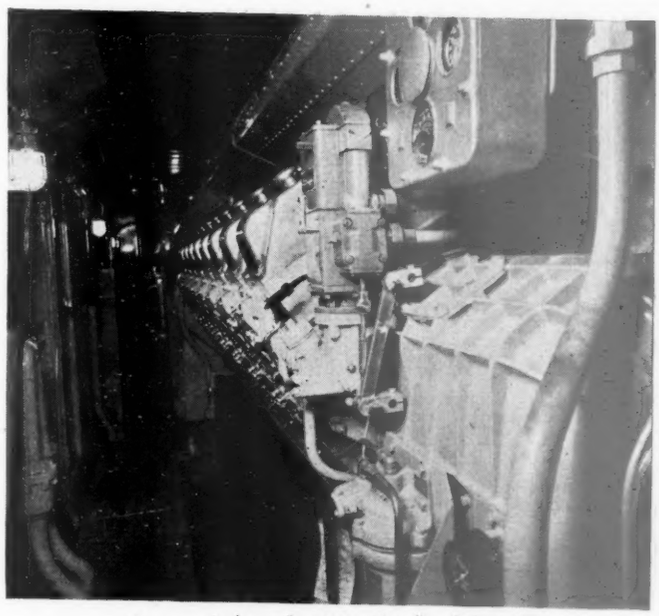
The locomotive-body framing construction consists of two side trusses supported on the ends of the body bolsters. These trusses are designed to carry the entire body loads with a minimum of deflection. The members in the truss are connected top and bottom with large gussets, and are welded together in one unit, special care being taken in the design to permit longitudinal welds only. Where the underframe members connect with the trusses, gussets are used to develop the full value of the members. At body bolsters and at each end of the roof hatches, in addition to the end frames, extremely strong arches afford sufficient strength to take care of torsional stresses when jacking up the locomotive body at diagonally opposite corners.

The underframe consists of cross members of rigid type to minimize deflections in the support of the power plant. Center sills are in effect continuous and are proportioned to take care of 400,000 lb. static end load, and the entire locomotive body meets the Railway Mail Service specifications for mainline trains.

Material used in the body framing is high-tensile steel wherever required to keep weights to a minimum. Exterior sheathing of the superstructure consists of stainless steel. On all flat surfaces metal-covered plywood is used to provide maximum strength with minimum weight. All metal sheathing is applied "loose" so that



The Airtemp Compressor and Condenser Unit Mounted under the Car



The Engineroom of the Locomotive

it carries none of the stresses and, therefore, will always remain smooth and without stress wrinkles.

This locomotive is provided with two four-wheel motor trucks of EMC design with special features. Truck bolsters and truck frames are General Steel Casting's high-tensile castings providing minimum weight, and all forgings are of special steel. Trucks are of the equalized type with swing hangers for lateral motion. A special spring suspension is used to promote easy riding, and hydraulic shock absorbers dampen side sway when the locomotive enters or leaves curves at high speed.

Timken roller bearings, in journal boxes of EMC design, are provided. The E-12 axles are made according to A.A.R. specification M-104-34. The Bethlehem 36-in. wheels are carbon-molybdenum, heat-treated. Center plates are equipped with both horizontal and vertical wear plates.

The locomotive is equipped with Westinghouse HSC straight and automatic brake schedule. Simplex clasp brakes are provided, four unit brake cylinders per truck, with automatic slack adjusters interconnected each side of the truck so that a hand-brake equalizing lever placed at one end of the truck will apply the brakes on all of the wheels. Two extra long brake shoes per wheel are used. Main-reservoir pressure is 140 lb. with brake-pipe pressure from 100 to 110 lb.

The Power-Plant Equipment

Power-plant equipment consists of a 16-cylinder, V-type, 1,200-hp. two-cycle EMC Diesel engine, direct-connected through a flexible coupling to a General Electric generator of sufficient capacity to transmit continuously the rated output of the engine to the traction motors under all conditions for which the locomotive is designed. Power plant equipment is arranged to provide maximum accessibility for either maintenance or removal.

Auxiliary equipment consists of a General Electric exciter-auxiliary generator set (for main generator excitation, charging the battery, and operating locomotive lights, fuel pump, and control equipment), a Gardner-Denver mechanically driven air compressor, air intake fans, and two Vapor-Clarkson steam generators, which furnish steam for all train heating purposes.

The power produced by the prime mover is delivered to the driving wheels through an electrical transmission consisting of the G. E. generator, four G. E. traction motors and control apparatus. The generator is designed to provide a characteristic most suitable for this particular engine. The main engine is cranked by motoring the main generator. Special starting fields, incorporated in the generator, are connected to the storage battery through magnetic contactors which are operated by a push-button switch located at the control station.

General Dimensions of the Rocket's 1,200-Hp. Diesel Locomotive

Length overall (approximate)	59 ft.
Width over posts	9 ft. 10 in.
Height from rail to top of roof	13 ft. 11 in.
Height from rail to top of floor	4 ft. 5¾ in.
Height from rail to floor of operator's cab	7 ft. 4 in.
Number of trucks	2
Number of driving wheels	8
Diameter of drivers	36 in.
Number of traction motors	4
Truck centers	34 ft.
Truck wheelbase (4-wheel)	8 ft. 6 in.
Approximate weight (one-half supplies)	220,000 lb.
Tractive force (starting) at 25 per cent adhesion	55,000 lb.
Tractive force (60 m.p.h.)	6,400
Maximum speed	117 m.p.h.
Maximum curve radius	275 ft.

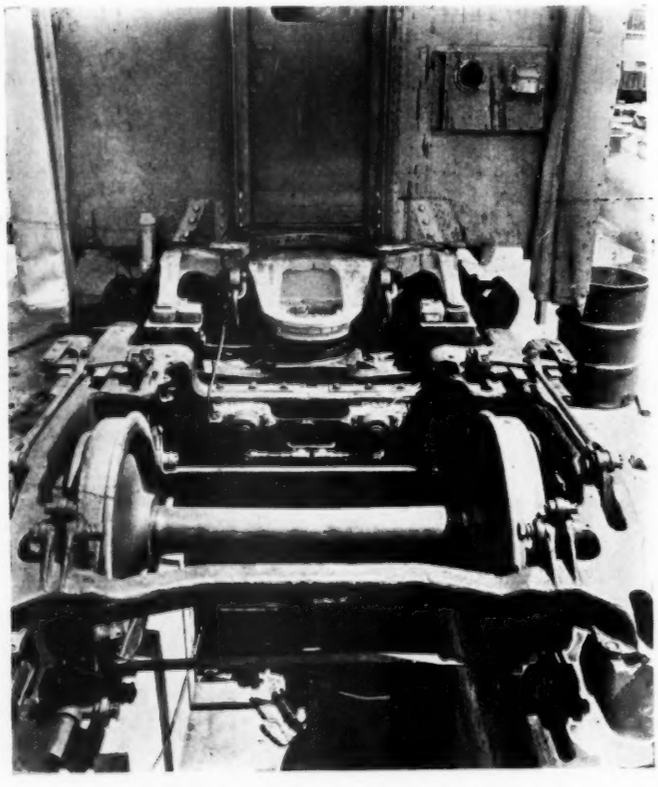
The four traction motors (two per truck) are geared to the driving axles and supported in truck frames by a spring-nose type suspension. Motors are of the self-ventilating type, air being supplied through ducts from the power plant compartment. In the four-wheel truck, the air duct has a flexible connection between the locomotive platform and the motor intake, arranged so as to permit free movement of the truck. The permissible minimum continuous speed is 38 m.p.h., and the minimum hourly speed 26 m.p.h. Maximum permissible locomotive speed is 117 m.p.h. with 52/25 gear ratio and 36-inch wheels.

The auxiliary generator and exciter unit, mounted above the main generator, is driven by V-belts from a shaft extension of the main generator. It supplies the current for battery charging and excitation of the main generator.

A 32-cell MVAH 26-plate Exide ironclad battery is furnished with each unit to supply power for engine starting, transmission control, and all locomotive lights. This battery has a capacity of 450 amp.-hr. at the ten-hour discharge rate.

The Gardner-Denver mechanical air compressor, direct-connected through a flexible coupling from a shaft extension of the main power plant, provides the air pumping equipment for this locomotive. The air compressor is of the two-stage air-cooled type, with intercoolers between the low and high-pressure pistons. The compressor is also provided with unloader valves controlled by a mechanical governor. The rated displacement of this compressor is 168 cu. ft. per min. at 750 r.p.m.

The two Vapor-Clarkson automatic oil-burning flash-type steam generators comprise the heating equipment on this locomotive, each generator having an evaporating capacity of 1,200 lb. of water at 200 lb. steam pressure. The two generators are located in the rear end of the locomotive and have a feedwater tank capacity of approximately 1,265 gal. Both generators receive their fuel from the main fuel tank.



One of the Trucks at an Articulation Point

The cooling system of the Diesel engine consists of water-cooling radiators, water tank, circulating pump and air fans for radiator cooling.

The radiators, which are of the fin-tube type, are hung in two sections parallel to the engine and supported from the removable hatch directly over the engine. The water tank is located below the level of the radiators to permit self-draining of the radiators when the engine is not running. The water circulating pump is located on the engine at the front of the blower drive gear case. The four air-circulating fans are 26 inch in diameter and are driven through V-belts from a shaft extension on the main generator. Air is taken into the locomotive through grilled and shuttered openings located in each side of the body as shown on the drawing. The fans supercharge the engine compartment to approximately one-half inch of water pressure, which pressure is permitted to vent through the radiators to atmosphere.

An exhaust muffler is located in a well in the hatch directly above the engine. The muffler is connected to the engine by individual pipes to each cylinder and exhausts to the air through stub riser pipes.

The lubricating-oil system consists of an oil tank, twin oil coolers, oil filter and pump. The oil supply reservoir is a copper tank having a capacity of 60 gallons. It has a large opening at the top for easy filling. The oil cooler (two of these units are used with the 1,200-hp. engine) is a newly-designed compact water-cooled unit which has ample capacity to maintain the oil at the proper temperature. Large size oil filters are installed ahead of the cooler. The pump is driven by the main engine.

The lubricating-oil system is of the dry-sump type. Two sumps, one at each end of the crank pan, are fitted with removable strainers. A dual scavenging pump draws the hot oil from these sumps and passes it through the filter and oil cooler to the oil-supply reservoir. Cool, filtered oil is taken from the supply tank by the pressure pump and distributed throughout the engine at the required pressure as regulated by a pressure relief valve, which discharges into the crankcase. A device is provided to close the engine throttle in the event of a deficient oil supply.

The locomotive fuel is carried in one tank under the car body. The fuel tank is equipped with gages and is arranged for filling from either side of the locomotive, and is properly fitted in accordance with Interstate Commerce Commission requirements. Fuel is delivered to the engine by means of an electrically driven fuel pump.

Brookings Report on Government Transport Policies

Survey made for Byrd Committee recommends consolidating work of various federal agencies

WASHINGTON, D. C.

THE Brookings Institution, in a lengthy report prepared for the Senate select committee to investigate executive agencies of the government with a view to co-ordination, which is headed by Senator Byrd of Virginia, has recommended that there be a consolidation into a single federal department of all promotional work relating to transportation and a re-allocation of regulatory functions, calling in most cases for the concentration of regulatory activity in the Interstate Commerce Commission. The report, which consists of more than 150 pages, goes into great detail to describe the powers, duties, and functions of those federal agencies which are primarily engaged in promotional and regulatory work in the field of transportation. The portion of the report devoted to rail transportation is small in comparison with that allocated to the other forms such as air, highway, and water.

Aid to Railroads Through PWA and RFC

The report points out that from the period of earliest development, the federal government has exhibited special interest in the affairs of rail carriers, and that during the early period of physical expansion, grants-in-aid of various kinds were bestowed upon rail carriers by the local, state, and federal governments. "But at present," the report says, "development work is left for the greater part to the railroads themselves. In contrast with motor carrier and inland water agencies, for example, rail companies are required to furnish in the first instance, and to maintain their physical right-of-way, tracks, and all operating appurtenances and aids, such as signaling devices, traffic controls, policing, etc."

The report next discusses the subject of federal promotion of activities which directly benefit rail interests and points out that there are several general federal activities which serve in an indirect way to promote the welfare of the carriers. Such agencies as the Reconstruction Finance Corporation and the Public Works Administration have made loans to the railroads for a variety of purposes. "Since in this financing activity," according to the report, "the government is merely assuming a function formerly performed for the carriers by private banking concerns, no real element of subsidy is involved. And, theoretically at least, funds are available on equal terms to other transportation agencies. It is, therefore, unlikely that any important question of conflict would arise between government lending policies and activities in the rail field and the promotional work relative to other forms of transportation."

The Brookings investigators feel that since the law prescribes conditions under which the Reconstruction Finance Corporation is permitted to extend loans to rail carriers subject to the Interstate Commerce Commission's regulatory authority, any problems of duplication or conflict created by government extension of credit to rail carriers would have no immediate bearing upon the administration of federal transport policy.

The report cites an example of how railroads benefit indirectly from the promotion activities of the federal gov-

ernment in other fields, in this case, the federal financing of grade-crossing elimination. The recent entry of the federal government into this field of activity will tend to decrease the amount of work that the railroads will have to do themselves.

The report briefly discusses the government operation of railroads, limited as it now is to the Panama Canal Zone and to Alaska, and states that this is not, from the standpoint of government organization, a transportation problem. It is pointed out that these railroads were constructed and are operated to facilitate the settlement and development of the territory of Alaska and the Panama Canal Zone; and the question of their continuance is one of national policy.

Gradual Increase in Federal Regulatory Control

While stating that the recent years have witnessed a decline in that portion of federal activity which could be termed direct promotion of rail transportation, the report holds that the federal government has not been indifferent to the place occupied by rail service in the economic organization of the country. "On the contrary," the report asserts, "since 1887, it has expressed continuous concern through the exercise of increasingly comprehensive regulation of every important phase of rail operation and management. More recently the scope of this interest has been broadened to include varying degrees of regulatory control over competing forms of transportation."

The authors believe that since the Interstate Commerce Commission is vested with exclusive administrative authority over all strictly regulatory phases of rail control, no problems of organizational overlapping are involved. It is their belief, however, that there is one specific phase of control over rail regulation which has relevance to the subject of the study. This is the subject of the federal administration of labor relations in the railroad industry.

Federal Control of Rail Labor Relations

Discussing the subject of labor relations in the railroad field, the report enumerates the various agencies that have been set up to settle disputes, such as the National Mediation Board and the National Railroad Adjustment Board. The report also points out that the federal government has assumed the responsibility of insuring to railroad employees engaged in interstate commerce the right to organize and bargain collectively without interference from employers. It has also assumed the task of designating the representatives of groups of employees where there is a reasonable doubt as to the majority choice. It is pointed out that although maximum hours of labor of certain classes of railroad employees have been fixed by statute; and safety devices insuring safer working conditions have been prescribed by congress and the Interstate Commerce Commission, yet the commission has no control over wages of rail employees.

"While the mediation and adjustment functions exercised by these two independent labor boards," says the report, "are designed to guarantee continuous and dependable rail transportation service through the maintenance of amicable labor relations, they do not constitute an integral or inseparable part of the rail regulatory scheme. More specifically the lodgment of these functions in independent units does not react adversely upon the administrative effectiveness of the Interstate Commerce Commission in applying rate, safety, consolidation, hours of service, and other regulatory provisions applicable to rail carriers."

After surveying the entire field of federal promotional and regulatory work in transportation, the Brookings researchers reach the following conclusions:

In general, two basic adjustments must be made if federal promotional activity is to be brought into conformity with the operating facts of the modern transportation system and if it is to be conducted in such a way that it will not run counter to adopted regulatory policy. First, an articulated national policy relative to federal promotional activity must be substituted for the present collection of divergent policies. Second, administrative machinery adapted to the application of this policy should be created, and certain adjustments should be made in the distribution of regulatory functions.

New Department Proposed

Two general proposals are made for the establishment of such machinery and adjustments:

1. Consolidation in a single agency, either a newly created Department of Transportation or a Division of Transportation in the Department of Commerce of all promotional work of the Federal Government (including direct operation of transportation business) which is carried on primarily in the interest of transportation development.

2. Reallocation of regulatory functions, calling in most cases for the concentration of regulatory activity in the Interstate Commerce Commission.

In the matter of optional adjustments, consideration should also be given to the validity of transferring to the Department of Transportation, or a division of transportation, certain portions of the work performed by the following agencies:

1. That portion of the Coast and Geodetic Survey activities which involves coastal mapping—from the Department of Commerce.

2. Activities of the Hydrographic Office and the Naval Observatory, which relate primarily to commercial water transportation—from the Navy Department.

Increased Activity for I.C.C.

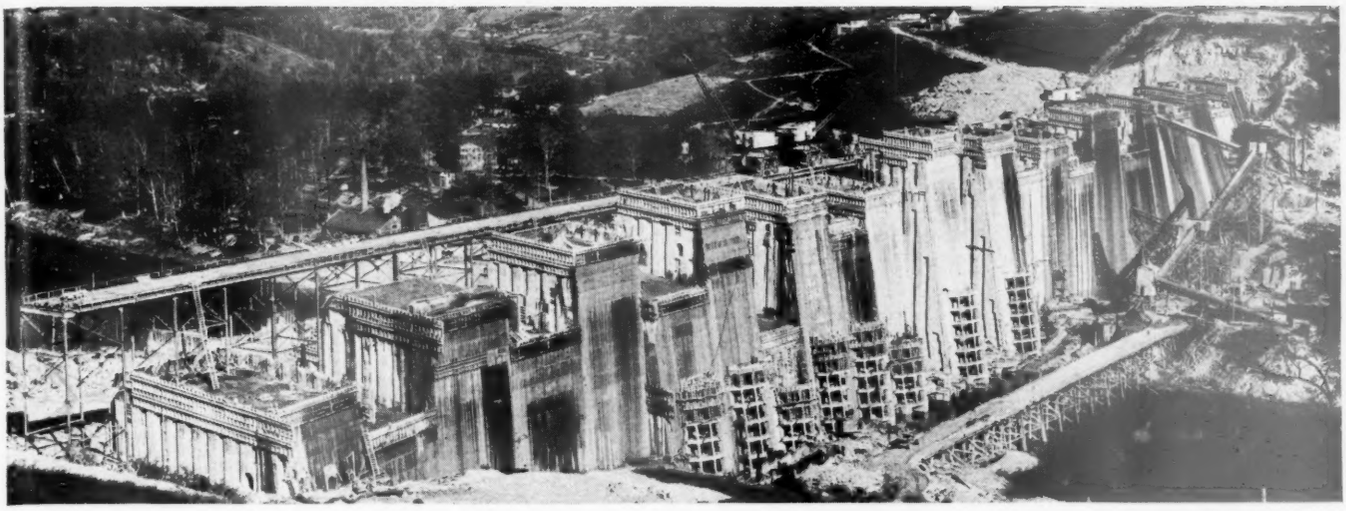
Regulatory adjustments.—The second point in the twofold proposal for reordering Federal activity in the transportation field calls for the centralization of regulatory functions in the Interstate Commerce Commission. Again, as in the case of the proposal for the creation of a department of transportation, distinction is made between specific recommendations and general suggestions.

Thus, transfer of the following functions to the Interstate Commerce Commission is recommended:

1. All those regulatory functions now exercised by the Maritime Commission which are not essential to the administration of the construction and operating subsidies.

2. Regulatory functions now exercised by the Bureau of Air Commerce relative to air transportation, accompanied by those regulatory functions now exercised by the Division of Air Mail of the Post Office Department which are not indispensable to the proper administration of air-mail service.

In addition, detailed consideration should be given to the desirability of making adjustments in the methods now used in administering safety regulations applicable to water navigation; that is, in the operating relationships which exist between the Bureau of Marine Inspection and Navigation, the Maritime Commission, Bureau of Customs, and the Coast Guard. While the evidence at hand is not conclusive on all of the problems involved in this particular question, it appears (1) that all inspectional work which the Maritime Commission is now authorized to perform with its own personnel should be done for it by the Bureau of Marine Inspection and Navigation, and (2) it is quite possible that the service functions now performed by the Coast Guard relative to the enforcement of safety regulations should be combined with the general regulatory authority now exercised by the Bureau of Marine Inspection and Navigation and that the entire function should be transferred to the Interstate Commerce Commission.



The Upstream Side of the New Tygart River Dam, Which Required that the B. & O. Move a Branch Line Out of the River Valley

Difficult Problems Solved in Relocating Inundated Line

Flooding of Baltimore & Ohio branch in Tygart River valley in West Virginia by Federal dam project necessitated building new 12-mile railway through rolling country at large expense

ONE of the heaviest pieces of railway construction to be carried out in this country during recent years has just been completed on the Baltimore & Ohio in northern West Virginia. Here, forced out of the Tygart River valley by the huge federal Tygart dam and flood-control navigation-aid reservoir project now nearing completion, the road, at government expense, has built a new line 12.3 miles long, at a total cost of approximately $4,600,000.

In heavy rolling country, with broad deep valleys and with the problem of rising approximately 360 ft. to connections around the new reservoir area in the shortest practicable distance, the new line required heavy grading operations, which were complicated by the general tendency throughout for serious movement of the ground wherever disturbed. Altogether, approximately 2,725,000 cu. yd. of grading were required, the work involving many cuts up to 100 or more feet in depth, fills approaching 100 ft. in height, and the construction of two tunnels, one 2,346 ft. long, and the other 521 ft. long.

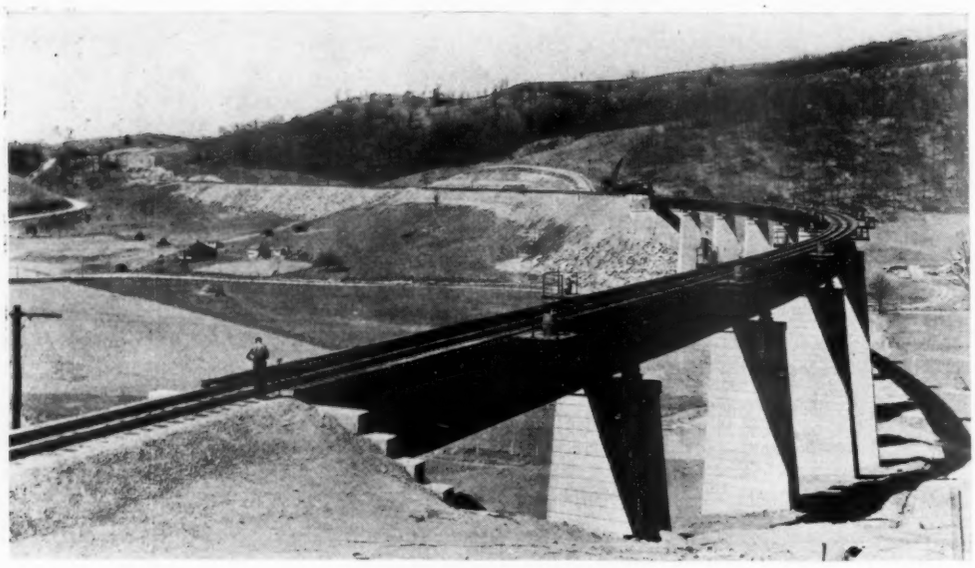
Crossing many lateral streams and being intersected at several points by highways, the new line required the construction of 23 bridges, three of considerable length, including one 590 ft. long over the Tygart river, and another 1,200 ft. long over one arm of the new reservoir. The bridge work involved was not especially difficult or unusual, but that it was of considerable magnitude is seen in the fact that the structures as a whole required the placing of approximately 77,000 cu. yd. of concrete and the erection of 3,500 tons of structural steel.

Among the especially interesting phases of the new line work were the location of the line itself to afford as favorable operating conditions as possible, at minimum construction expense, and the heavy grading operations involved, complicated as they were throughout by slides or threatened slides of large proportions in connection with both cuts and fills. Another feature of special interest is the speed with which the work was carried out, employing at the peak more than 230 units of excavating and grading equipment in two and three 8-hour shifts. Thirteen months after the work was started, 2,375,000 cu. yd. of grading, or approximately 87 per cent of the total, was completed, and by February 15, 1937, three months later, the last of the grading had been done.

Birdseye View of the Project

The line affected by the Tygart River Dam project is the Grafton and Belington single-track branch line of the road, which, leaving the Washington to Cincinnati and St. Louis main line at Grafton, W. Va., extends almost due south up the valley of the Tygart river, penetrating a large part of northern and central West Virginia, with its already important industries, especially coal mining, and with its extensive possibilities for much greater development.

Following the east bank of the river closely and at an elevation generally about 40 ft. above the bed of the stream, the G. & B. branch lay directly within the proposed reservoir area for a distance of approximately 12 miles. Directly at the site of the new dam, the old line will eventually be under approximately 200 ft. of water



The Structure, 1200 Ft. Long, With Piers Up to 95 Ft. High, Carries the Line Over an Arm of the New Reservoir

at peak stage. To visualize clearly the problem which confronted the B. & O. with the approval of the Tygart River project, in 1934, a brief outline of the project is desirable.

The Tygart River dam is one of a series of dams proposed in a plan of flood control for the Monongahela River valley and the vicinity of Pittsburgh, Pa. The waters of the Tygart river, flowing generally north through West Virginia, empty into the West Fork river at Fairmont, W. Va., and thence move northward in this river to a confluence with the Cheat river to form the Monongahela river. The Monongahela river then carries the run-off of these rivers into the Ohio river at the confluence with the Allegheny river at Pittsburgh.

Thus, in the plan to control the run-off from the principal tributaries of the Monongahela, the Tygart River dam has been built about 2½ miles above Grafton. This dam, which is 1,900 ft. long at full-pool level and which has a spillway height 215 ft. above the river bottom, will impound a reservoir in the upper valley, which, at full-pool stage, will be about 12 miles long, with approximately 68.5 miles of shore line and storage capacity for about 327,500 acre feet of water.

Through the regulation of gates at the dam, it is proposed to impound water in the reservoir during the spring seasons of normal heavy run-off in the Monongahela River valley, thus practically withdrawing any adverse affect from the Tygart River watershed, while during the summer, in periods of low water in the Monongahela valley, when river navigation is threatened, as it has been frequently in the past, it is proposed to release sufficient water from the Tygart reservoir to sustain navigation. By the first of each year, it is planned that the reservoir shall be practically empty in anticipation of early spring heavy run-off and possible flood conditions.

The Tygart river flood-control navigation-aid project, which is being financed by the Federal Emergency Administration of Public Works, is estimated to cost approximately $12,000,000. The dam itself calls for an expenditure of about $8,000,000. It is expected that the dam will be in full operation during the impounding period early in 1938.

Three New Rail Routes Considered

The plan for the Tygart reservoir immediately presented the problem of relocating the G. & B. branch outside of the reservoir area to permit continuing service to the important region served by the branch, and, of still greater importance, to maintain an outlet for the West Virginia and Pittsburgh branch of the road, a 125-mile branch line extending southward through the state, and connecting with the G. & B. branch at Tygart junction, near Philippi, W. Va., about 25 miles south of Grafton. With such a line contiguous at many points to undeveloped fields of high-grade coal, it was not only necessary that the G. & B. branch be continued in service, but also that the relocated section be built to high standards and with favorable operating conditions.

Three routes for the relocated line were considered. One of these involved the relocation of the old line along the new east, high-water shore line, connecting with the old line just above Moatsville, W. Va., about 12 miles south of the dam site. This plan called for 16.5 miles of new line construction and a heavy grade for 2¼ miles from Grafton to the top of the dam or reservoir level, beyond which point, south to Moatsville, the new line could have a level grade practically throughout. Heavy grading and many waterway crossings made this line expensive, it being estimated to cost in excess of $7,500,000. Bridges, trestles and culverts alone were estimated to cost approximately $3,500,000.

Another route considered was designated as the Simpson Creek line. This was to leave the main line about 8½ miles west of Grafton, and extend across country, following Simpson creek in part, joining the G. & B. branch less than a mile north of Philippi. This route would involve 14 miles of line construction at an estimated cost of $5,593,000, and, under the most favorable conditions, would have presented serious operating difficulties. Bridge construction alone was estimated to cost nearly two million dollars.

A third line relocation considered, and the one adopted, was called the Berkeley Run line. This line, like the Simpson Creek route, avoided the new reservoir area entirely by taking off from the main line about 1.5 miles west of Grafton and extending across country, in part along Berkeley run, to a connection with the G. & B. branch about 1.6 miles north of Philippi. This line, while extending through rolling country and involving heavy grading and two tunnels, required only 12.3 miles of new line construction, at a total expenditure of approximately $4,500,000, more than $3,000,000 less than the high-level reservoir line considered, and more than $1,000,000 less than the Simpson Creek route. Together, the bridges and the two tunnels required on the Berkeley Run line called for an expenditure of only $1,338,000. At the same time, it shortened the line run to Philippi

by 8.8 miles and afforded operating conditions equal to or better than those possible on either of the other two routes considered.

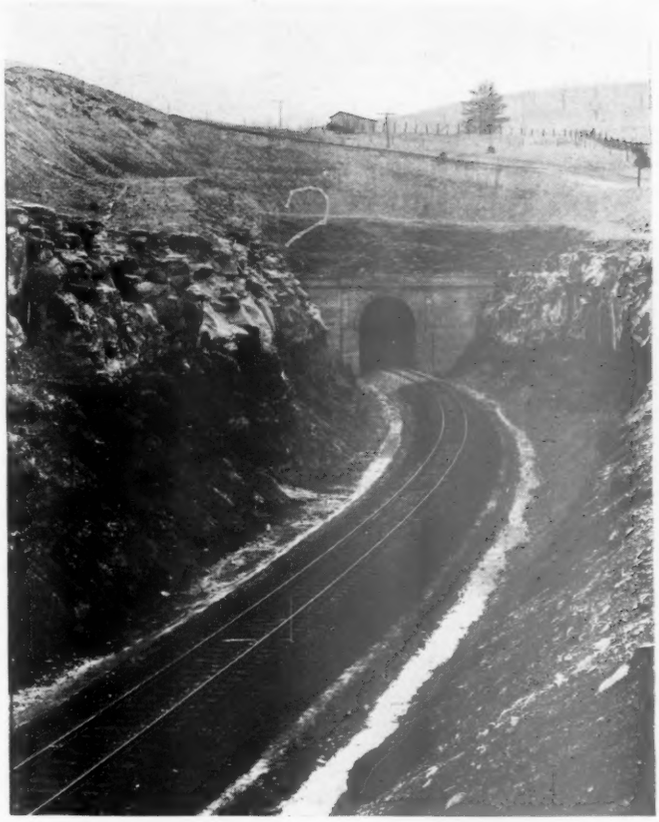
Branching off from the main line, the new line begins to rise immediately to reach the summit, 361 ft. above the starting point, about 8.8 miles distant, with the easiest possible grades. To take the fullest advantage of the terrain while at the same time balancing grading operations as far as possible, the profile of the line was varied somewhat, although throughout the entire distance to the summit the grade is consistently upward, with a total of approximately seven miles of one per cent ruling grade. In view of the shortness of the route, this amount of ruling grade could not be avoided, and yet it is not considered serious since it is all against empty and with loaded movement. Beyond the summit, the line descends for 3.5 miles on an 0.37 per cent grade to a connection with the G. & B. branch, this grade being the only one against loaded traffic.

The alinement of the new line is unusually favorable in view of the character of country traversed, involving a total of 17 curves, with only 7 of 4 deg. or more. Of these latter curves, the most severe include one of 5 deg., another of 6 deg., and a third short one of 6 deg. 45 min. directly at the point of departure from the main line.

Heavy Grading

Grading over the entire new line was heavy. This was occasioned not alone by the rolling character of the terrain, with broad valleys at many points, but also by the varied and uncertain character of the soil encountered, which indicated the advisability of through cuts wherever possible, rather than sidehill cuts, because of the possibility of slides. Of the many cuts on the north half of the line, five, involved in excess of 100,000 cu. yd. of excavation each. One of these required the removal of 147,000 cu. yd. of earth and various classes of rock, another 162,000 cu. yd., and a third 195,000 cu. yd. The largest cut has a side slope 109 ft. high on the uphill side. In this same section of the line there are many fills of more than 50,000 cu. yd., the largest including one of 118,000 cu. yd. and 75 ft. high, and another of 139,000 cu. yd. and approximately 85 ft. high.

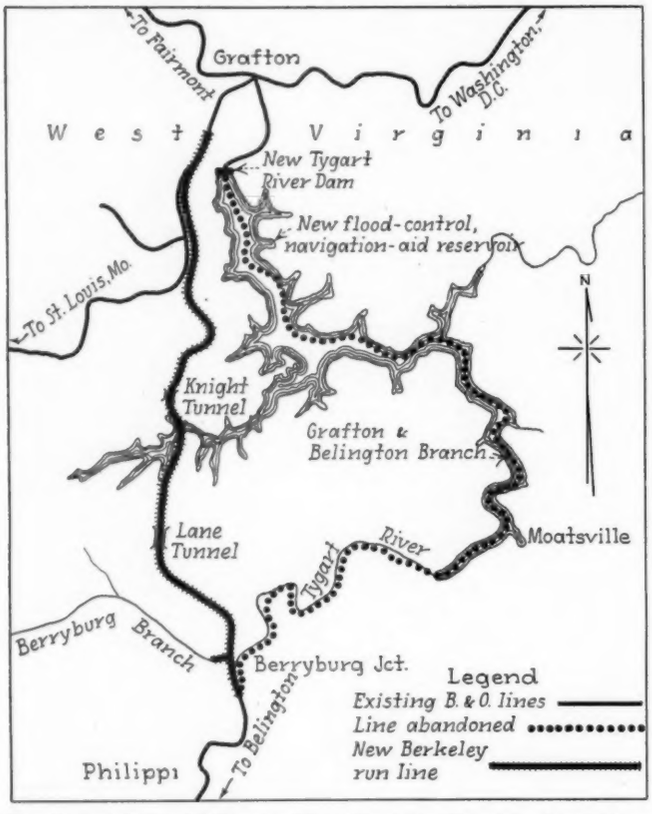
There Were Many Cuts Requiring From 100,000 to 300,000 Cu. Yd. of Excavation



Both the Lane and Knight Tunnels, With a Combined Length of 2,867 Ft., Are Lined With Concrete

On the south half of the line the grading was even heavier than on the north half, with cuts as deep as 130 ft., requiring 320,000 cu. yd. of excavation, and several large fills, including one approximately 2,200 ft. long and 100 ft. high, which involved the placing of approximately 450,000 cu. yd. of material. This largest fill was occasioned in part by a long section of highway realinement, which, in itself, required approximately 75,000 cu. yd. of filling. Altogether, as already pointed out, the new line required a total of approximately 2,725,000 cu. yd. of grading, not including the 65,000 cu. yd. of excavation in the two tunnels. Of the cut excavation, approximately 40 per cent was in strata of red, yellow, gray and black shale, with considerable sandstone at many points, while the remainder was largely in common earth and layers of red and yellow clay.

The most interesting phases of the grading were the heavily mechanized methods employed, the speed with which the work was carried out, and the difficulties encountered at numerous points with slide conditions. At one time, more than 230 major units of equipment were employed on the grading and tunnel excavation, this equipment including fourteen 1½-to 2½-yd. power shovels, 7 power cranes, 1 steam locomotive, 13 tractor bulldozers, 33 hauling tractors, 50 tractor-trailer wagons of 10 to 14 cu. yd. capacity, 32 trucks of 2 to 10 cu. yd. capacity, 3 carryalls, 20 portable air compressors, 15 wagon drills, 15 pumps, 1 electric tunnel shovel, 2 tun-



The Tygart River Valley in West Virginia, Showing the Federal Dam and Reservoir Project, the B. & O. Branch Affected, and the General Location of the Relocated Line

nel mucking machines, 3 tunnel locomotives, 20 tunnel dump cars and 4 complete field blacksmith shops.

Working through the winter of 1935-1936, and much of the time on two or three 8-hour shifts, approximately 87 per cent of the grading, representing approximately 2,375,000 cu. yd., was completed during the first 13 months of work to November 15, 1936. To permit night operations, mile after mile of the new line was illuminated by electric lights, hung from temporary power lines which were supplied with current by seven portable electric-lighting plants.

The greatest obstacles to speed in the grading operations were the long hauls involved and the almost constant difficulties with slides. On the greater part of the line, the average haul was in excess of 2,000 ft., and on certain parts of the last six miles of line, a large part of the haul was as much as 7,000 to 9,000 ft. Slides, as a whole, necessitated approximately 450,000 cu. yd. of additional grading.

Much Trouble With Ground Movement

The slide conditions encountered in the construction of the line were not unanticipated. Wherever sizeable cuts had been made in highway construction throughout the general territory traversed by the new line, slides or a distinct tendency for slides had been observed. However, whereas the extent of these slides was minimized by the relatively shallow depth of the highway cuts, slide conditions became pronounced in the case of many of the deeper railway cuts.

The conditions promoting the unstable character of the ground when disturbed were largely its stratified character, with seams at various levels of soft, highly lubricant fire clay overlaying rock. In spite of the fact that the stratification was practically horizontal, and that many of the soft clay seams were not more than one-half inch to one inch in thickness, breaks would occur far back from the cuts being excavated, and the entire hillside would move forward and down on one or more of the seams.

In dealing with this tendency toward slides, a number of measures were employed which were effective in both preventing slides and in minimizing their extent where they did occur. In the first place, cut slide-slopes were made 1 to 1 instead of ¾ to 1 as had been hoped earlier would be possible. At a number of points, long, deep French drains were constructed parallel with the track, from 100 to 300 ft. up the hillside, in an effort to intercept ground water which might find its way into and through the clay seams. These drains were pitched for ready drainage and, where necessary, were provided with pipe outlets to carry off the water collected.

At other points, where test borings showed soft clay seams overlying rock, the rock was drilled at intervals and blasted apart with relatively light shots in order to permit drainage through it of any water which might find its way into the clay. It is difficult to appraise the effectiveness of the different methods employed in dealing with the slide conditions, except that it is observed that many slides were much smaller than might have been anticipated, and, at many points, no slides occurred in spite of almost ideal natural conditions for their development.

In all deep cuts where there is any likelihood of slides developing in the future, the side slopes were benched at one or more levels, these benches ranging in width up to a maximum of 50 ft. Furthermore, where there is any tendency for water collecting on the benches to move toward the track, berms and berm ditches were provided, and the water is thereby either conducted to the ends of the cuts, or down the faces of the side slopes to the track ditches in split vitrified tile drains. At places where side ditch run-off will be exceptionally heavy, concrete flumes were constructed.

Difficulty with the tendency for slides was encountered in large fills as well as in cuts. Having observed this early in the work, the larger fills were built with a deep layer of heavy rock at the base to aid in anchoring the fills and to insure drainage. This practice was carried out in spite of the fact that it frequently required the wasting of material to permit the placing of the rock first. Furthermore, all fills were placed in layers not exceeding three feet in thickness, and each layer was compacted thoroughly by the heavy haulage equipment before the succeeding layer was placed.

In addition, where fills were constructed on sloping ground, the necessary grubbing and excavation were car-

All of the High Fills on the Line Were Made Self-Draining by Placing Rock at the Base and Providing Openings Through Them

ried out to insure secure anchorage, and adequate culverts or French drains were provided through the fills to prevent their impounding water. At several of the larger fills, where there was a tendency for the natural ground adjacent to the low side to push up under the heavy load of the embankments, the fill itself was broadened out at the base on the low side with waste material, as necessary, to stabilize conditions. The problems encountered with some of the fills are better appreciated when it is realized that the largest are approximately 100 ft. high, and have base widths up to 325 ft.

23 Bridge Structures

Bridge construction on the new line assumed considerable proportions, including a total of 23 structures, ranging in size from long reinforced concrete box and arch culverts to a 590-ft. river bridge and a 1,200-ft. reservoir arm crossing, and including a total of 97 pipe culverts and two long concrete flumes. Both of the long bridges mentioned are multiple-span, deck plate girder structures, the former, with six 100-ft. spans, extending over the Tygart river near the south end of the line, and the latter, with twelve 100-ft. spans, crossing an arm of the new reservoir extending up the valley of Pleasant creek, near the center of the line. Both of these structures are supported by concrete piers and abutments.

The maximum height of the river bridge piers is approximately 28 ft., while in the case of the reservoir crossing, the piers are much taller, the more central ones reaching a maximum height, top of foundation to top of coping, of approximately 94 ft. The river bridge is straight, but at a skew of 37 deg. with the center line of the river, while the reservoir bridge is on a 4-deg. curve, with the piers approximately normal to the adjacent spans. Both structures have open-type decks of preframed, treated bridge ties.

Another sizeable bridge on the line is a nine-span overhead highway structure, which was made necessary by an important road change. This structure, with most of its spans 53 ft. long, has multiple-column type piers and a deck of longitudinal I-beams supporting a concrete roadway slab. The most interesting feature of this structure is that it is on a 12-deg. curve and provides superelevation in the 30-ft. roadway reaching a maximum of 3 ft. 1 in. This increasing elevation across the slab is afforded essentially by a series of steps longitudinally across the tops of the piers and abutments providing increased height for each line of stringers progressively from the low side of the deck to the high side. Another more or less similar highway bridge constructed, although with only three spans, carries a highway down a 5.66 per cent grade across the line on an 8-deg. curve for which 30 in.of superelevation was provided in the deck.

Other structures constructed include three concrete-encased I-beam spans, four open-deck spans employing ordinary I-beams or wide-flange beams, four reinforced concrete arches with spans from 12 to 25 feet long, and seven long reinforced concrete box culverts, generally 6 ft. by 8 ft. inside. The most unusual features of the arches and culverts are their length, which, with two exceptions, range from 123 ft. to 331 ft., and the care with which these structures were constructed to prevent settlement and wash of the fill about them. In this latter regard, both sides of the structure were backfilled throughout their length with porous material to a thickness of 12 in., drained at the bottom by a line of 6-in. corrugated iron pipe, surrounded by coarse broken stone.

The longest flume constructed on the line is 1,450 ft. long, while the largest flume in section is 807 ft. long. The latter flume, which carries a creek across the right-of-way through a drop of 43 ft., is essentially a reinforced concrete box for 39 ft. directly beneath the roadbed, while above and below the track crossing it is an open-top concrete box structure, 8 ft. wide by 5 ft. 6 in. deep.

The two tunnels on the new line, both single track, are known as Knight tunnel, which is 521 ft. long, and Lane tunnel, which is 2,346 ft. long. These tunnels, the former requiring approximately 13,000 cu. yd. of excavation, and the latter the removal of approximately 52,000 cu. yd. of material, added materially to the extent of the work involved on the new line, but presented no particularly unusual or difficult construction problems.

Knight tunnel is on a 6-deg. curve throughout its length and rises to the south on a 0.5 per cent grade, while Lane tunnel is on tangent, on a 1 per cent grade ascending to the south. Lane tunnel provides a horizontal clearance of 18 ft. and has a maximum vertical height above top of rail of 24 ft. 7/8 in., while Knight tunnel, because of its curved alinement, was given a horizontal clearance of 20 ft. 6 in., resulting in a maximum clear height above low rail of 25 ft. 3 7/8 in.

Both tunnels penetrate strata of various kinds of shale, limestone and clay, so much of which was unstable in itself or upon exposure that it was necessary to install timbering almost throughout. In this work, segmental I-beans were employed in the arch, supported on H-beam wall plates and I-beam plumb posts. Throughout most of both tunnels, the arches were lined with steel liner plates, bolted to the webs of the I-beam timbering, to protect subsequent construction operations. All excavation in the headings was carried out with tunnel mucking machines, while some of the excavating of the benches was done with an electrically-operated, full-revolving shovel. In all cases, the material removed was hauled out of the tunnels in five-yard side-dump cars.

Both tunnels were provided with concrete wall footings and side gutters, surmounted by a continuous concrete lining having a minimum thickness of 18 in. The arch lining was backfilled to the face of the natural rock with concrete, and the same was true of the side walls, except in wet areas, where coarse gravel was employed to insure ready drainage of ground seepage to weep holes near the base of the side walls.

The footings and gutters, and the side walls to a point near the spring lines, were poured by gravity from a car-mounted hopper, while the upper part of the walls and the arches were placed pneumatically with equipment mounted on a flat car. Three 30-ft. sections of steel forms were used in most of the lining work.

All of the location studies and the design and construction work on the Berkeley Run line were carried out by the engineering department forces of the Baltimore & Ohio, under the direction of H. A. Lane, chief engineer, assisted by A. C. Clarke, assistant chief engineer, Richard Mather, assistant to the chief engineer, and P. G. Lang, engineer of bridges. The field work was carried out under the immediate supervision of W. W. Gwathmey, Jr., assistant engineer, and J. W. Jones and U. S. Holden, resident engineers. The government, which approved all plans and let all contracts, was represented during the major part of the work by Lt. Col. W. E. R. Covell, district engineer, U. S. Engineer Corps, Pittsburgh, Pa.

The general contractor on the new line was the Guthrie, Marsch, Walker Company, Chicago. The Bethlehem Steel Company, Bethlehem, Pa., furnished and erected all of the structural steel for the larger bridges.

British Rate Increase Is Double Wage Rise Award

IN Great Britain the railways have recently been granted rate increases; and railway employees wage increases. The comparative modesty of the latter, and the seriousness with which the British regulatory authorities apparently take their duty to permit railway owners to earn a little money, provide an instructive contrast to parallel developments in this country.

The British railways have consistently in recent years failed by a considerable margin to earn the "standard" return which is the criterion by which, under the law, the Railway Rates Tribunal is required to measure the adequacy of the rate level. The railways had not heretofore asked for rate increases, however, because they doubted whether such increases would materially improve their position. But this year they did ask, and have recently received permission, for a general increase of all rates and fares by approximately 5 per cent, believing that such an increase could be made to "stick" to an extent that it would effect some material improvement in their net income.

Various shipping organizations opposed the increase on the grounds (1) that they were unable to meet the added expense; (2) that the increase was not in the public interest; and (3) that the increase would not improve the railways' net income. The Rates Tribunal held that it was not its function to consider the ability of a shipper to pay, except to the extent that it could be shown that higher rates would result in loss of traffic to the railways, and hence that they would leave the railways in worse financial condition than they would be without the increase. On the question of public interest, the Rates Tribunal found no warrant in the Railways Act for taking, on such an allegation, any steps which would prevent the railways from earning their standard return—in other words, the Act is taken to indicate that there is a "public interest" in permitting the railways to earn their standard revenue. As for the contention that the rate increase would yield no increased revenue, the Tribunal expressed the belief that it would show at least some improvement over existing rates.

The railways estimated that the proposed increase, if no traffic were diverted to competitors, would yield increased revenue of approximately $37,500,000, but conceded the likelihood of some diversion and arrived at an estimate of $28,000,000 as the probable net increase in revenues.

At approximately the same time that the Rates Tribunal made its rate award, the Railway Staff National Tribunal handed down a decision on wages and working conditions estimated to cost the railways $14,500,000—which is to say that the rate rise will provide additional revenues about twice the sum of the increased labor costs. In general, the pay rise went no farther than to restore the pre-depression wage level (reduced by 2½ per cent in 1931, one-half of the deduction having since been restored. Pre-depression overtime schedules were likewise re-established (time-and-a-quarter days and time-and-a-half nights; with straight time work on nights and Sundays paid for at penalty rates). The Tribunal denied the demand of the unions for the establishment of a minimum wage of $12.50 a week, but made an increase of 25 cents per week in the base pay of all employees earning less than $11.25 a week, with a minimum wage of $10 a week for adult male employees.

The Staff Tribunal, in reaching its decision, weighed carefully the financial condition of the railway companies. While this is not ideal, and capital has not received the share of earnings contemplated for it under the wage deduction decision in 1931, nevertheless the railways are enjoying increased traffic and revenues, and tax relief to the extent of some $10,000,000 annually was granted them last year—this item alone being sufficient to cover about two-thirds of the wage increase awarded. The pay deduction of 2½ per cent, while of relatively small size, has been in effect in whole or in part for more than six years.

Congress Quits Leaving Little Rail Legislation

By Walter J. Taft
WASHINGTON, D. C.

ASIDE from the enactment of the two laws covering the management-labor compromise agreement on pensions for railway employees, no major railroad legislation was passed at the first session of the seventy-fifth Congress which adjourned last Saturday evening. Because much of the time since the opening on January 5 was consumed in controversy over New Deal proposals, notably the successful drive to defeat the Supreme Court reorganization bill, the session has been characterized in many reviews of its activities as one which will become more famous for what it did not do than for its legislative output. In such a set-up there was but little time, in "between-the-acts" lulls, to devote to matters outside the center ring; and while various bills affecting the railroads received intermittent attention and many were here and there advanced towards enactment, there was no "follow-through" with respect to any of major importance save the retirement-plan bills. Bills pending when adjournment came will retain their status in the next session.

Again a bill for the repeal of the long-and-short-haul clause of the Interstate Commerce Act was sponsored by Representative Pettengill of Indiana and passed in the House of Representatives, but again it was pigeonholed in the Senate committee on interstate commerce of which Senator Wheeler of Montana, an inter-mountain state, is chairman. The vote in the House, where the measure passed on April 14, was 268 to 120. Unless this bill passes at the next session it will lose its outstanding champion in Congress, as Representative Pettengill has announced that he will not be a candidate for re-election when his present term expires; he will resume the practice of law.

Only One "Make-Work" Bill Passed

Organized labor's usual group of "make-work" bills was again before Congress, but only one of these—the signal inspection bill—was enacted into law. This bill gives the Interstate Commerce Commission power to require installations of signaling devices. It is estimated that its administration will cost the government a maximum of $67,000 a year, while the cost to the railroads will depend upon what signaling work the commission may require them to do. The train-limit bill, however, was advanced further than ever before when it passed the Senate on July 26. This has now been converted into a "safety" measure, its principal sponsors denying that it would create any additional employment. It was reported favorably by the Senate committee on interstate

(*Continued on page 275*)

Electrification at Commercial Frequencies

European experience indicates the possibility of further developing the single-phase motor

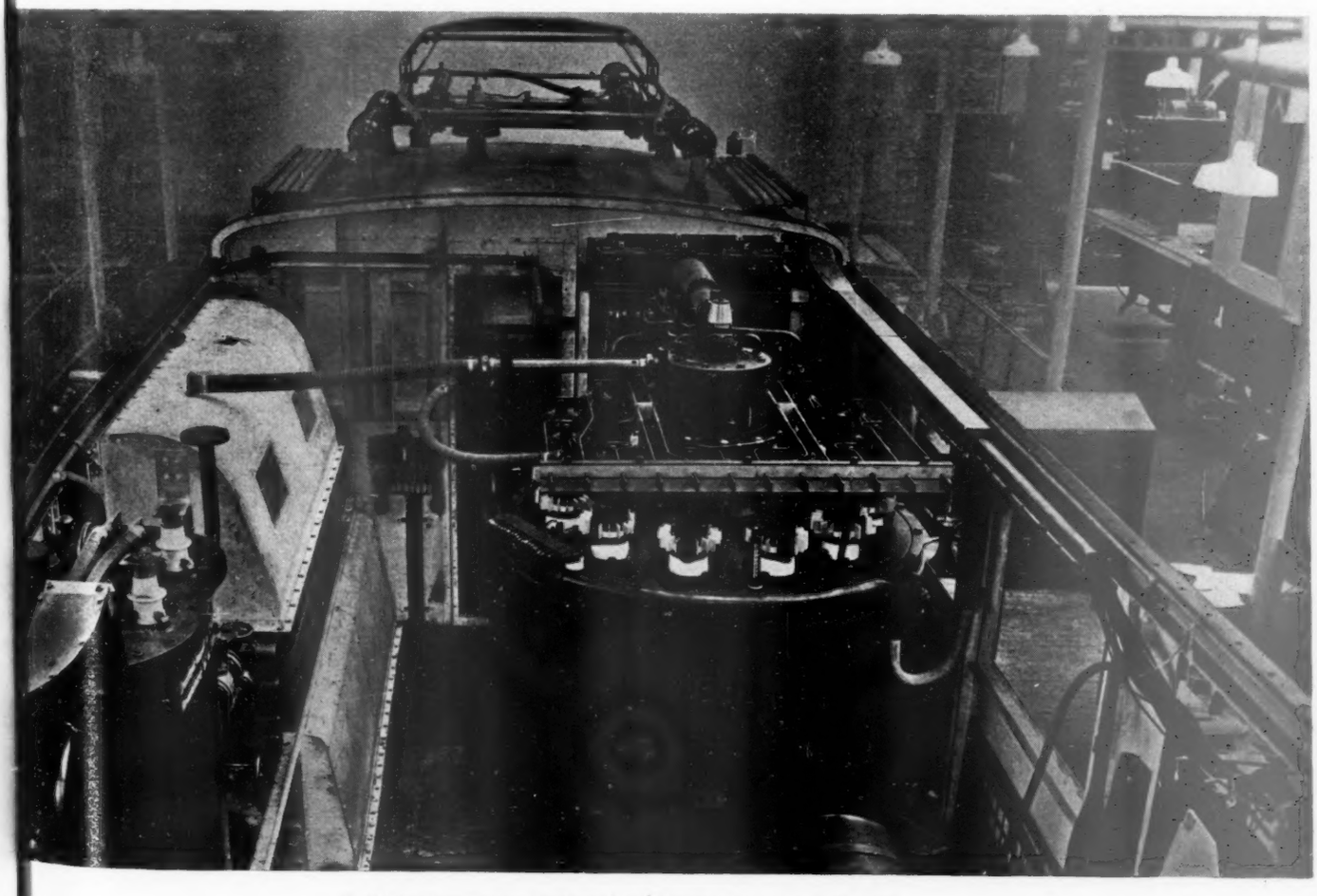
By Ludwig F. Roehmann, Electrical Engineer, New York, N. Y.

IT seems rather curious that there is no general agreement concerning what kind of power is best suited to the requirements of railroad electrification. In 1935, a study of 1,500- and 3,000-volt d.c. systems, fed by rectifiers, and 11,000-volt 25-cycle a.c. systems, fed by rotary converters, was made by A. M. Wright.[1] These systems were considered for the electrification of railways in England. The following year D. Serbescu,[2] a Rumanian railroad official, completed a study of 3,000-volt d.c. and 15,000-volt, 16⅔-cycle a.c. systems, for application to the line between Campina and Brasov on the Rumanian railroads. In both of these investigations, it was assumed that the required energy would be supplied from large industrial three-phase networks, and not generated in railway owned plants. This corresponds to present practice in the United States.

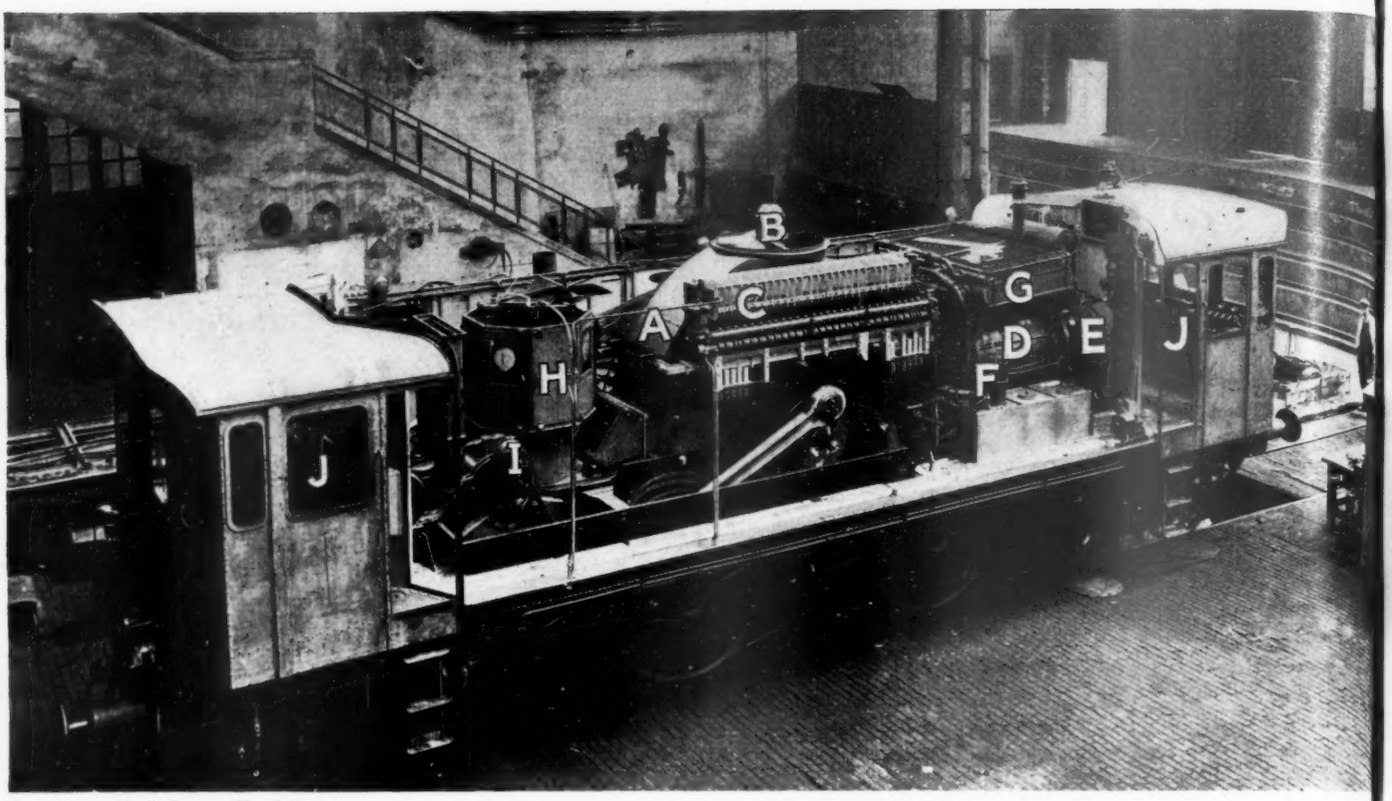
The desirability of using power at commercial frequencies, and thereby disposing of converting apparatus, has long been considered, and the following is a resume of the progress made in Europe. Three studies of this

[1] A. M. Wright, Electrification of Railways, J. Inst. El. Engs. (London) 1935, vol. 77, no. 468 (oct.), p. 826.

[2] D. Serbescu, Die Einrichtung des elektrischen Zugbetriebes auf der Linie Campina-Brasov des rumaenischen Eisenbahnnetzes, Elektr. Bahnen 1936, vol. 12, no. 4, p. 77.



Rectifier Locomotive Designed by Messrs Brown, Boveri & Cie



By courtesy Prof. L. von Verebely

High-Speed Kando Phase-Converter Locomotive

A Main Traction Motor	**F** Oil and Cooling Water Pumps
B Its Ventilating Fan	**G** Water Cooler
C Main Switch Group	**H** Water Resistance
D Phase-Converter	**I** Its Circulating Pump
E Exciter	**J** Engineer's Cabin

problem were made in 1932 and 1933,[3, 4, 5] and the question was answered in the affirmative by Hungary,[6] when the scheme developed by the Hungarian engineer, Kandó, was adopted.

The Kando System in Hungary

In 1934, the Hungarian State Railways initiated electric service on the main-line Budapest-Hegyheshalom (border to Austria), section of the intercontinental line Paris-Istambul. This electrified line, about 120 miles long, is divided into three separate sections. The catenary of each section is fed by means of step-down transformers with 16,000-volt, 50-cycle single-phase current, taken from one phase respectively of the 110-kv. three-phase public network. The 50-cycle single-phase energy is converted on the locomotive into three-phase current by the Kandó-converter: "The essential part of the Kandó-locomotive is the phase-converter: transformer, sychronous motor and generator in one unit, which receives 16,000-volt 50-cycle, single-phase current and converts it into 800/1,300-volt three-phase current for driving the main motor of the locomotive, which is of the induction type."

The converter has an oil-cooled stator and a water-cooled rotor and operates at a 100-per cent or leading-power factor. It is described in detail in the papers "Kandó Phase Converter" and "The Kandó System of Electric Traction on the Hungarian State Railways." [7, 8]

Operating results, after disposing of initial difficulties, have been very satisfactory.[9] The total service will be maintained with 22 locomotives, all of the same type (1-D-1), having a one-hour rating of 2,500 h.p. and a maximum speed of 63 m.p.h.

Before adopting this scheme, one question among many others which required careful study was the interference on communication lines caused by an unbalanced system of comparatively high frequency with ground return. But theoretical considerations, as well as practical experiments, showed the effects on cabled wires are of the same order as those caused by 16⅔ or 25 cycles, because the compensating effects of the cable sheath also increases with the increase of the frequency.[10]

Recent German Experiments

The last electrification using three-phase current of industrial frequency directly has just been completed in Germany. Like Austria, Norway, Sweden and Switzerland, Germany has generally adopted the single-phase, 15,000-volt, 16⅔-cycle system for main-line electrification. But in order to study all possibilities, the German

[3] R. Langelois-Berthelot and P. Letrilliart, La traction électrique à 50 périodes par seconde, Congrès International de l'Electricité, Paris 1932, Sect. V, report no. 8.
[4] W. Wechmann, Bahnstrom aus der öffentlichen Elektrizitaetsversorgung unter Berueckssichtigung der neuesten Technik, World Power Conference, Sectional Meeting Scandinavia, 1933, Section 7, report no. 37.
[5] Th. Boveri, Stromsysteme für elektrische Bahnen, World Power Conf., Sec. Meeting Scand., 1933, Sect. 7, report no. 55.
[6] L. de Verebély, Main Line Electrification with 50 Cycles A-C, World Power Conf., Sect. Meeting Scand., 1933, Sect. 7, report no. 96.
[7] Kandó Phase Converter, Electrician 1933, vol. 110, no. 2850, p. 39.
[8] The Kandó System of Electric Traction on the Hungarian State Railways, Engineering 1933, vol. 135, no. 3496/3505/3507, pp. 58/296/349.
[9] L. von Verebély, Betriebserfahrungen auf der mit 50 Hz Wechselstrom elektrisierten Linie Budapest-Hegyheshalom, Elektr. Bahnen 1934, vol. 10, no. 4, p. 73.
[10] A. Zastrow und W. Wild, Die Beeinflussung der Fernmeldeanlagen durch Einphasen-Wechselstrom-Bahnanlagen von 50 p/s, Siemens-Z, 1935, vol. 15, no. 7, p. 390.

State Railroads electrified the line running from Freiburg, Baden, up to heights of the Black Forest, about 35 miles long, with grades of 5.5 per cent "as an experiment" with single-phase current of 20,000 volts, 50 cycles. The line was divided into two separate sections, fed from the 110-kv., three-phase industrial network, by means of step-down transformers in Scott-connection, statically changing the three-phase into two-phase current. Each of the three large German electric manufacturing companies, Allgemeine Elektrizitats-Gesellschaft (AEG), Brown, Boveri & Cie (BBC) and Siemens Schuckert-Werke A.G. (SSW), constructed one locomotive, a fourth being built by Fr. Krupp A.G. (Krupp).[11] All of these machines have the same single-phase, 50-cycle power input, about 2,200-kva., sufficient to carry a load of 180 tons, at a speed of 37 m.p.h., on the grade of 5.5 per cent. Each machine has four independently-driven axles and looks like the usual 16⅔-cycle locomotive of this type, but the design of each locomotive is entirely novel.

Rectifier Locomotives

The AEG-machine uses a step-down tap-transformer, a single-phase steel-tank, grid-controlled, mercury-arc rectifier and four d.c. series motors. Grid-control is used for changing continuously from one tap to the next, and under normal operation the rectifier anodes are fully excited. The BBC-machine also has a step-down transformer, a grid-controlled rectifier and four d.c. motors, but grid-control is used only in emergencies.

Single- and Three-Phase Motors in Combination

The Krupp locomotive is equipped with a transformer and with four twin-motors, each twin consisting of a normal, three-phase induction motor of 500 kw. and a mechanically and electrically-connected, single-phase Krupp-motor of the same rating. This Krupp motor, developed by Schoen,[12] is a very interesting design. It maintains a power factor of unity or leading at any speed, by means of an intermediate, d.c. excited rotor, running at synchronous speed in the space between the stator and inner rotor. The locomotive has three synchronous speeds. When using the Krupp-motors alone, the speed is 37 m.p.h. With the three-phase motors alone, the speed is 52 m.p.h. (the Krupp-motors then operating as phase converters), and with both motors joined in cascade, the speed is 22 m.p.h. (the Krupp-units operating partly as motors, partly as phase-converters). By means of liquid resistances, any intermediate speed can be obtained. Regeneration without additional devices is possible.

50-Cycle, Single-Phase Motors

The simplest, and therefore probably most promising, construction was designed by SSW. The principal commutation difficulties involved in designing single-phase series motors for the industrial frequency of 50 cycles have been overcome by lowering the voltage supplied to each motor. The locomotive is equipped with a tap-transformer and with 8 series motors of 250 kw. each, respectively. Two motors, driving one axle, are connected in series, the maximum voltage on each motor being 255 volts, compared with 590 volts supplied to a normal 500-kw., 16⅔-cycle motor.

The results of this recent experiment claim considerable interest. If a safe and economic service can be realized, prospects are opened for possibilities of feeding electric railroads directly from the public three-phase networks, avoiding certain minor inconveniences still involved in the Hungarian Kandó-system. If the design-engineers would succeed in developing large single-phase series motors operating at industrial frequency,[13] or if static frequency converters could be designed, which can be operated safely on locomotives, a great stimulus would be given, also in this country, to the electrification of the main-lines (not to the extension of existing electrifications) with current of industrial frequency.

[11] O. Michel, Die neueste Entwicklung der elektrischen Fahrzeuge der Deutschen Reichsbahn unter besonderer Beruecksichtigung der elektrischen Fahrzeuge der Höllentalbahn, Elektrotechn. Ztschr. 1936, vol. 57, no. 39, p. 1113.

[12] L. Schoen, Die Motoren der Kruppschen Höllentalbahn-Lokomotive, Elektr. Bahnen 1935, vol. 11, no. 3, p. 61.

Congress Quits Leaving Little Rail Legislation

(*Continued from page 272*)

commerce without hearings, but the house committee on interstate and foreign commerce postponed action until the next session when it will hold hearings.

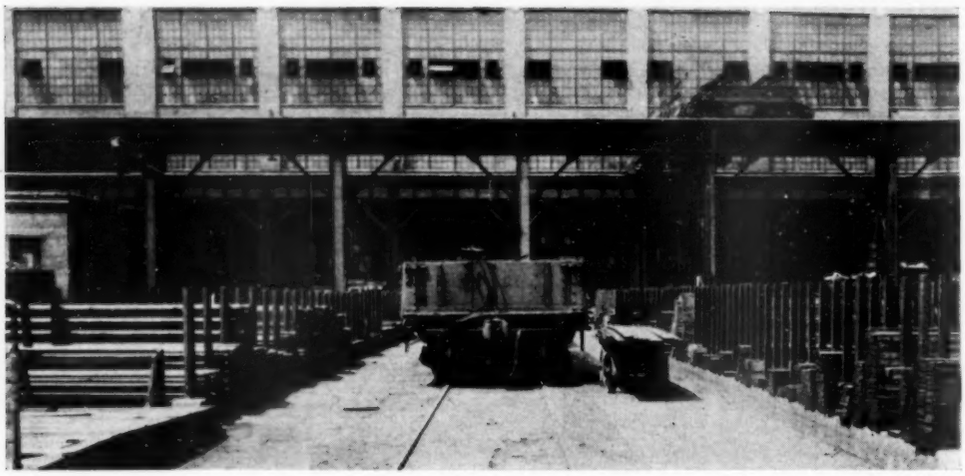
Other "make-work" bills, which for the next session remain introduced or in various stages of their journey through Congress, include the six-hour-day bill, the "full" crew bill, the track inspection bill, and the train dispatching bill. The latter, which would authorize the Interstate Commerce Commission to prescribe working conditions for dispatchers, was reported favorably in the Senate but later recommitted after an agreement on the issues had been reached by the railroads and their dispatchers.

Outside the "make-work" category, other bills affecting the railroads included that designed to facilitate the offering of drought-relief rates and the so-called "seeing-eye" dog bill. Both of these were enacted into law. The former, which had the approval of the Interstate Commerce Commission and the Association of American Railroads, amends Section 22 of the Interstate Commerce Act so as to provide that after the I. C. C. has defined the period, area and class of persons entitled to relief rates, no carrier shall be deemed to have violated the act's provisions with respect to preference or discrimination "by reason of the fact that such carrier extends such rates only to the class or classes of persons defined in the order of the commission authorizing such reduced rates." The "seeing-eye" dog bill permits blind persons to take guide dogs with them in coaches and Pullman cars under regulations prescribed by the Interstate Commerce Commission. Also enacted were the Guffey Coal Bill and that extending the lending powers of the Reconstruction Finance Corporation to June 30, 1939.

Remaining for the next session are such bills as the government ownership bill, a bill to equalize freight rates as between sections of the country, bills to place water and air carriers under the jurisdiction of the Interstate Commerce Commission, the "through routes" bill which would amend the Interstate Commerce Act to permit the Interstate Commerce Commission to prescribe through routes and joint rates without reference to the short-hauling of any carrier and to provide that the elimination of any existing through route or joint rate without the

(*Continued on page 278*)

[13] W. Kummer, Die Ausbildung von Einphasen-Bahnmotoren für die Frequenzen der allgemeinen Kraft- und Lichtnetze, Bull. Schweizer El. V. 1936, vol. 27, no. 19, p. 538.



Bar Iron Storage at Columbus

Unusual Methods Mark Pennsylvania Supply Work

More details on use of cards in Storekeeping—Practices spread to roundhouses and shops

Part II*

AN exception from the general use of cards by local stores for ordering and distributing supplies is made with air brake material supplied from Fort Wayne, Ind. Each store has a card for each item of air brake material carried, as with other material, but, principally for the convenience of the air brake shop in filling orders and keeping track of distribution, the cards are held by the stores and the desired information for ordering is transferred to a printed form containing a complete list of all items of air brake material standard to the Pennsylvania with the reference number of each item, the prescribed scrap price, if any, and blank spaces in which to show the quantity being returned for repairs, the last 30 days' consumption, the quantity on hand, the quantity ordered and the quantity shipped from Fort Wayne. This list is also filled in with pencil from the storekeeper's cards.

In general, cards received at the distributing stores which cannot be filled from stock are not held by the distributing store, but are returned, properly marked, with the other cards. Neither does the distributing store perform clerical work of back-ordering against cards not filled. The sub-stores are usually protected until the next shipment, and, if not, the cards are returned in ample time to notify the distributing store of a shortage by telephone or by issuing a special order.

The only materials which are not distributed in the above manner are wheels, special appliances, materials ordered for classified repairs, materials ordered for the process shops, trucks and scrap, and special shipments or transfers. In January, the Columbus store handled 13,679 cards, and 115 cars out of 392 of all kinds of material loaded out by the distributing store during the month carried materials ordered by stock cards. Based on the cars loaded and also on the estimated value of material shipped, the distribution of materials through the medium of cards was equivalent to about 30 per cent of all the materials shipped from Columbus.

Shops Carded

Decking, lining and flooring for the car work at Terre Haute, Ind., are ordered by Terre Haute on headquarters at Philadelphia and shipped direct to Terre Haute from the mills, but finished lumber for the work at Terre Haute is ordered on Columbus by the card method and all other lumber used in the region, except that used by the car shop at Columbus, is ordered by card. The use of these cards on the Western region has also been extended to the tank shop at Columbus, which uses the cards for filling its requirements for all lumber and small materials in place of shop requisitions.

Special Shipments

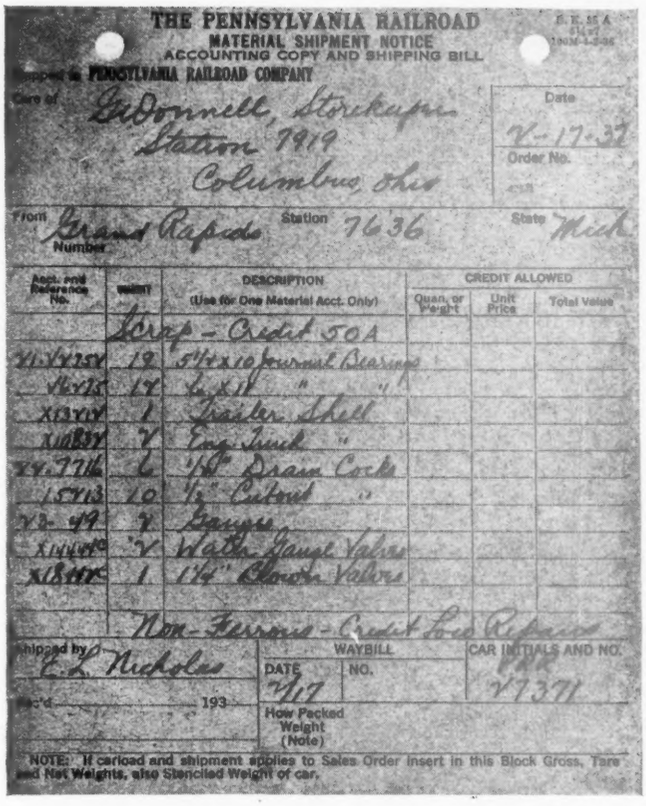
More or less frequently in the supply work, some stores have occasion to request special shipments of standard or special materials. Likewise, distributing stores frequently order the transfer of material from other stores in the region, or transfer materials beyond the borders of the region. If Columbus receives an order by telephone and the material is standard and must be shipped by baggage, only a shipping tag is prepared. If special material is ordered or the material is to be shipped by freight, a special form is used which, while less simple than the stock card, can also be made out in pencil.

* Continued from the *Railway Age* of August 21.

This form is called a material transfer order and consists of six sheets of paper 5 in. wide and 7 in. long, with carbon backs and fastened together with staples to form a compact pad. Only one item of material is described on this form. The original is marked in pencil with the name and address of the consignee, the material account to which the material is chargeable, the date, the name and location of the shipping store, the material classification number, the item number and general description, also the quantity ordered, the quantity shipped, the date of shipment, the weight and the car number. This information is automatically reproduced on the other blanks. Carbon copies are mailed to the accounting department where they are priced and extended or are used to clear the material account of the region and for distributing expenditures to operating accounts. One copy stays at the distributing store, a second copy is the consignee's receiving record and a third copy is the waybill which moves with the car to destination and then goes to the freight auditor. The storekeeper is also a freight agent.

A slightly different record is prepared when scrap or other materials are shipped in to Columbus from outside points. The blanks are the same size as the transfer record, but 12 items of materials can be shown on the blank, providing the material falls into the same material account. There are spaces on this form for the use of the accounting department in computing the credit allowed. This report is also made in pencil, and one writing produces copies for the accounting department, for the freight agent, the receiver of the material, etc.

Materials are drawn from the distributing and substores for local consumption on requisitions or withdrawal orders which are signed by the shop and car department supervisors and identify the job on which the material is to be used. When material is issued, these requisitions are marked by the stockmen with the stock account and item reference number, and all requisitions received during the day are mailed the same day to the regional accountant for pricing and charging the material out of stock and into the proper division of operating expenses. All pricing and stores accounting for the mechanical department of the Western region is performed by the regional accountant at Fort Wayne.



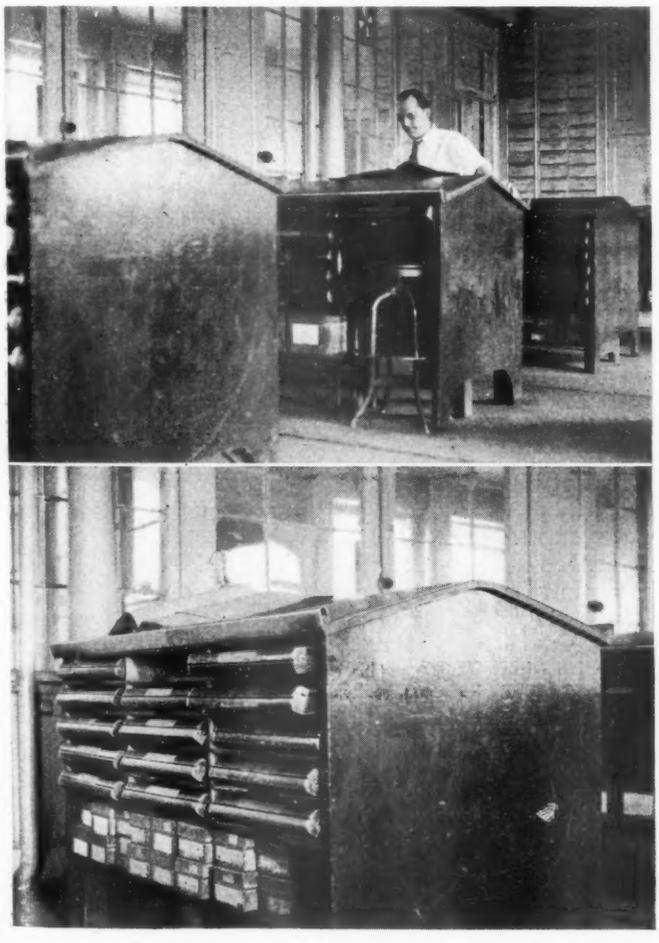
THE PENNSYLVANIA RAILROAD
MATERIAL SHIPMENT NOTICE
ACCOUNTING COPY AND SHIPPING BILL

Shipped to PENNSYLVANIA RAILROAD COMPANY
Care of L. Donnell, Storekeeper
Station 7919
Columbus, Ohio
Date V-17-37
Order No.
From Grand Rapids Station 7636 State Mich
Number

Acct. and Reference No.	QUANTITY	DESCRIPTION (Use for One Material Acct. Only)	CREDIT ALLOWED Quan. or Weight	Unit Price	Total Value
		Scrap - Credit 50A			
X1-5X225Y	12	5½"x10" Journal Bearings			
X5X15	12	5"x10" " "			
X13Y1Y	1	Trailer Shell			
X1B3Y	1	Eng. Truck "			
X4-7716	2	¾" Drain Cocks			
15713	10	½" Cutout "			
X3-49	1	Gauges			
X14404	1	Water Gauge Valves			
X13417	1	1¼" Blowoff Valves			
		Non-Ferrous - Credit Local Ref.			

Shipped by E. L. Nicholas
Rec'd ——— 193—
WAYBILL DATE V-17 NO.
CAR INITIALS AND NO. PRR V7371
How Packed Weight (Note)
NOTE: If carload and shipment applies to Sales Order insert in this Block Gross, Tare and Net Weights, also Stenciled Weight of car.

Form for Returning Material—Filled In With Pencil—Copies, Including Waybill, All Made Without Using Carbon Paper



Loose-Leaf Stock Records in the Storekeeper's Office at Columbus

Detailed accounting for material issued is greatly reduced by establishing working stocks wherever practicable. This is done in all cases where all of the stock is to be used for the same class of work in one place, and where the necessity of charging the material to one or more specific units of equipment can be avoided. Thus, while stocks at enginehouses for making running repairs to locomotives must be charged out as issued, an exception is made in the case of small bolts, nuts, piping fittings, etc., used indiscriminately on various locomotives, and a monthly distribution is allowed where materials are stocked for running repairs to cars and for program work in locomotive and car shops. Stock cards are used to replenish this stock, whether it is in the hands of the store department stockmen or shop or car men, but the material may be drawn from these stocks as needed without shop requisitions. In a single enginehouse in the Western region, carrying 400 items of material, the application of this plan cut the clerical work in half by eliminating 200 shop tickets a day.

The monthly distribution of such stock is made by taking monthly inventory on the special stock cards used only for inventory purposes, one card for each item. The quantity of each item withdrawn from stock during the month, as shown by the difference between the current and previous inventories, is reported on a charge-out book furnished by the accounting department. This

THE PENNSYLVANIA RAILROAD
WESTERN REGION

Ordered on
Material Shipped by Fort Wayne General Repair Shop
Returned to

Date _____ 193__

12-11-3-36

Bagg. Check _____
Car No. _____

Acct. & Ref. No.	Returned For Repairs Quan.	Scrap Price	Description	Consumption Past 30 Dys	On Hand	Add'l Req'd	Shipped From Ft. W.	Acct. & Ref. No.	Returned For Repairs Quan.	Scrap Price	Description	Consumption Past 30 Dys	On Hand	Add'l Req'd	Shipped from Fort Wayne
Acct. 22								Acct. 23							
78751		.047	Dirt Coll.1"Centrifugal					4265		.06	Plugs,Fill.Det.L. Detroit				
78932		-	Gaskets,1-1/4" Dirt Collect.					4266		.06	Plugs,Fill.#919 Comp.Det.Lbr.				
78957		-	Gaskets,Vabcl.K2 Triple Vlv.					4293		.045	Diaph.Assy.Detroit Model A Lbr.				
77032		.006	Gaskets, ..A. Portion					4295		12.00	Detroit Mech.Lubr.Model A				
77883		.048	Dirt Coll.1-1/4" Cont.Pass.					4360		.04	Valve,Water & Feed Comp #42A				
70000		-	Gask.Pipe Brkt.M3A Feed Vlv.					4400		4.806	Lubr.Mum Type,1924				
78379		1.44	Portions U-12 Q.A.					4465		8.50	Lubr..Edna M1,6P, 24P				
81296		.702	Portions #6 Dis.Fln.Cyl.Cap.					4490		2.90	Lubr.McCord 2P,2.T "LD"#101				
81297		.702	Portions,#6 Dist.Q.A.Cyl.Cap					4611		8.70	Lubr.Nathan #141, 6P, 8P				
82790		1.00	Device,Single Car Test,Frt.					4618		5.25	Lubr.Nathan #121 Type P				
82803		1.00	Device,Single Car Test,Pass.					4623		4.806	Lubr.Nathan #31,5P,5P,P3A				
83822		.067	Collectors,1-1/4" 1/2" Drain					4624		5.821	Lubr.Nathan #41,Type 1918, 6P				
83823		.047	Collectors,Dirt 1"1/2"Drain					4625		8.717	Lubr.Nathan #151, 7P, 9P				
83836		.047	Collectors,Dirt,3/4"1/2" Dr.					4642		01	Plugs,Dr.Cocks Fig.1 Nathan				

Portion of Printed List Used by Stores in Western Region for Shipping Air Brake Supplies to and Ordering Material from the Air Brake Shop

book is forwarded to the accounting department on the first day of the month, and the cards are then returned to Columbus. This procedure, aside from reducing clerical work, has given excellent results in distributing charges to freight car repairs and has been instrumental in reducing discrepancies in annual inventories.

During January, there was taken into the maintenance of equipment account of the Western region $588,588 of purchased materials, $348,311 of transfers, $637,668 of materials manufactured in company shops and $227,247 of material from reclamation plants. Disbursements in the same month included $1,363,039 of material used or sold, $165,176 of materials for manufacturing operations and $173,058 of transfers, leaving a regional maintenance of equipment stock balance of $2,698,970.

Accounting statements are not true measures of the volume of maintenance materials actually handled and do not accurately show the volume of work required of the storekeeping forces in the region. It is considered noteworthy, however, on the Pennsylvania that the storekeeping of the region is performed with only 299 men. Of these, 138 are employed at Columbus. Material pricing for the region is all performed in the regional accounting office by three clerks.

THE PENNSYLVANIA RAILROAD
MATERIAL TRANSFER ORDER
ACCOUNTING COPY

S.K.-1 A
8-1-8mf
SSRM-11-23-35

Ship to PENNSYLVANIA RAILROAD COMPANY
Care of C. M. Jacoby, Stekman
Logansport, Indiana

Charge Account: Mofe

M. T. O. Number and Date: V 12 — 2-6-37

FROM Columbus STATION 7919 STATE Ohio
NUMBER

REF. NO. 45B-8438 ea.
6" Slim Taper Files

CORRECT: C. M Jacoby

QUANTITY	FORWARDED TO	APPROVED BY:
V	Columbus	W R Davis

RECORD OF SHIPMENT

QUANTITY Number	Unit	UNIT PRICE	TOTAL VALUE	WAYBILL DATE	WAYBILL NUMBER
V	ea			V/24-37	1773

DESCRIPTION OF ARTICLES AND MARKS	WEIGHT	CAR INITIALS AND NUMBER
1 pkg.	7 lbs	PRR 173456

Received _____ 19 _____

Form for Special Shipments—Copies Made Without Inserting Carbon Paper—One Copy is a Waybill

Congress Quits

(*Continued from page 275*)

consent of all carriers parties thereto or authorization by the commission shall be deemed suma facie unreasonable; also, bills to apply the "commodities clause" to pipe lines, to limit judicial review of rate orders, to regulate forwarders, to permit the granting of reduced fares to army and navy men, to amend the safety appliance act so as to facilitate civil suits for injuries to employees, to amend the retirement act so as to count service in the armed forces of the United States as "years of service" in the calculation of railway employee pensions; and the government reorganization bill.

The session's major railway legislation—the embodiment into law of the compromise agreement on pensions—was hailed on all sides as an outstanding example of capital-labor co-operation, which should be a lesson for all industry. As the amendment to the Railroad Retirement Act and the companion Carriers' Taxing Act proceeded through committee hearings to favorable consideration in both branches of Congress, senators and representatives vied with each other to find suitable superlatives with which to pay tribute to the work of the management and labor committees which negotiated the the compromise. Meanwhile as the session was drawing to a close word came from Chicago of Railway Labor Executives Association plans to start work on a bill to set up a separate unemployment system for railway workers.

Motor Transport Section

The Fleet of the Freight Division of the Burlington Transportation Company Consists of Modern, Safe Equipment

Burlington Trucks Make Their Schedules Safely

Consistent runs, rather than spurts and delays, produce excellent on-time record and prevent accidents—

THE freight division of the Burlington Transportation Company was not organized until the summer of 1935, but in 1936 more than two million truck-miles were operated over 1,500 highway route-miles. Moreover, in the same year, this was the only central western trucking company to receive the safety award of the American Trucking Association. During 1936, also, it was one of the few highway freight transport companies engaged wholly in hauling and independent solicitation of freight to show a net income instead of a loss, after all factors, including depreciation, had been considered.

The Burlington Transportation Company, wholly-owned bus-operating subsidiary of the Chicago, Burlington & Quincy, has been in operation for a number of years, and several articles covering its operations have appeared in the Motor Transport Section of the *Railway Age*. It was not until 1935, however, that the C. B. & Q. decided to form a freight division of this company to engage in highway trucking. In September of that year, the negotiations were completed and the necessary authorizations procured.

The Merchants Cartage Company, with headquarters at Galesburg, Ill., one of the largest Illinois truck operators, was the first to join the freight division of the Burlington Transportation Company. Later, the Peterson Truck Lines, Corning, Iowa, and the Corn Belt Trucking Company, Ottumwa, Iowa, were also consolidated into this system which now operates between Chicago and Omaha and between Omaha and Kansas City, roughly paralleling the parent railroad, with numerous branch lines, as shown on the accompanying map and with headquarters in Galesburg, Ill. Applications are now on file with the Interstate Commerce Commission at Washington, D. C., for the inclusion in this system of the Sands Motor Express and the routes of the Bell Transfer Company in Burlington territory, which, if granted, will mean that the mileage of the system will be approximately doubled.

So far, no attempt at rail-highway co-ordination has been made between the freight division and the parent railway. The question, however, has been the subject of much careful study for some time past. It is expected that, in the near future, the results of these studies will be put into actual operation and a complete system of rail-highway co-ordination installed. However, the operating, solicitation and accounting forces of the trucking company are operating independently of the railway,

although the president of the transportation company is also assistant to the executive vice-president of the railway.

Equipment

The freight division owns a fleet of 103 highway freight units, in addition to numerous service cars, etc. Believing that modern equipment and its proper maintenance are potent factors in safety, the management has modernized and standardized its equipment in the last two years, until now the fleet is in excellent condition mechanically.

The main shops are located at Galesburg, Ill., Kewanee and Rock Island, and at Ottumwa, Iowa, and the division does all its own repainting, body-building and general overhauling of motors at these shops. Maintenance is conducted on a mileage basis, and this is rigidly adhered to. For example, no truck is permitted to run beyond the fixed mileage between valve-grindings, regardless of whether the valves still seem to be in good condition. It is felt that, by following this fixed program, road delays and breakdowns are avoided and the cause of safety furthered.

Inspection for Safety

At the completion of each run, each driver turns in a report as to the condition of his vehicle. In addition, the schedules are so arranged that each unit is garaged frequently at one or the other of the main shops where it receives a thorough inspection.

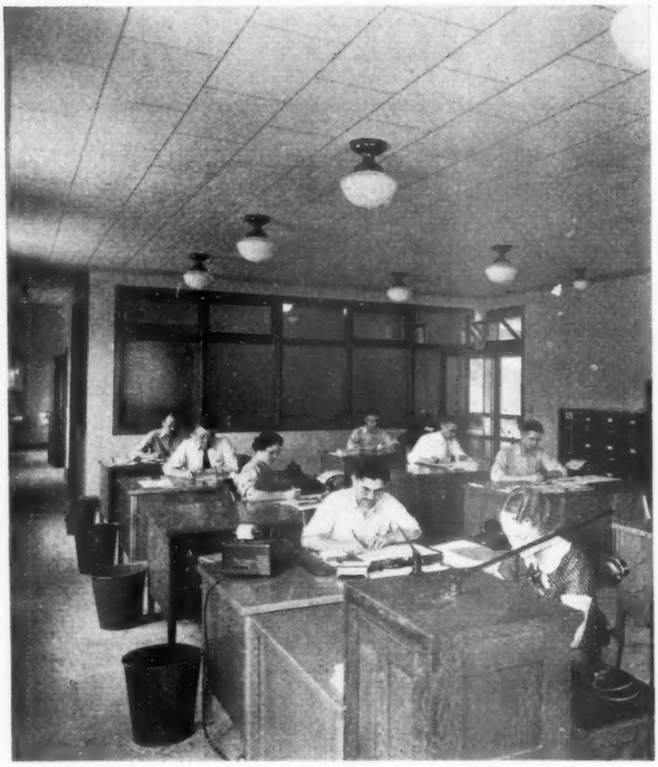
Thus, both the driver and inspector make trouble reports, and, regardless of the circumstances, the units are not permitted to go out on the road again until the trouble has been fixed. Such reports cover not merely accessories in need of repair, but also include a check after each trip of the safety appliances carried with each truck, such as light bulbs, flares, fusees, fire extinguishers, etc., to see that the full complement is there.

All equipment is supplied with air brakes, and a special device automatically applies the brakes on multiple units in case of accidental separation of the coupling between the tractor and the trailer.

Schedules

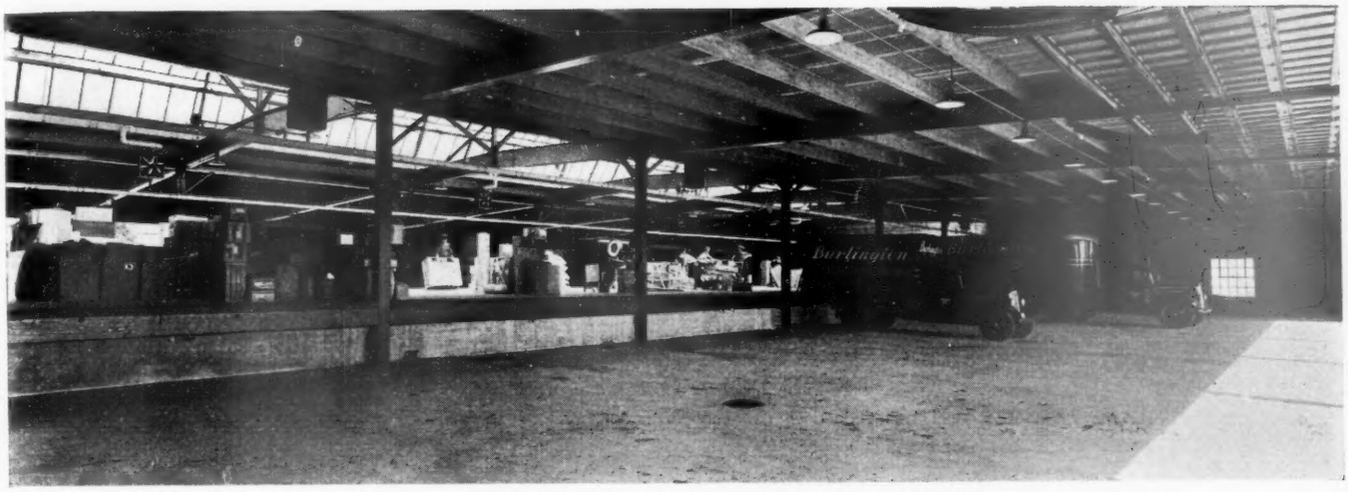
The schedules for the runs are worked out as a result of an operating officer actually riding the truck under normal conditions and gathering data as to traffic congestion, stops that must be made, the gradients of the road covered, etc. Thus, the schedules are worked out from actual operating practice, and not on a theoretical basis. No driver is permitted under any circumstances to "make up time." If he leaves a terminal late, he is still expected to arrive at the next terminal in the same elapsed time as an on-time run, thus avoiding speeding to make schedules, which is perhaps the most fruitful cause of accidents. Each truck of the Burlington freight division is equipped with a governor which holds the speed to a maximum of 35 m.p.h., and also with an automatic speed recorder which shows the speed for the entire run on a tape which is carefully checked by the operating officers. As a further safety factor, the driving hours of the employees are watched carefully. The longest run for any driver is 259 miles, and the longest tour on duty is 9 hr. 35 min. Also, no driver may start on a run unless he has had his legal hours of rest.

Actual experience with this system has shown its



General Offices of the Burlington Transportation Company at Galesburg

The New Terminal at Galesburg, Ill., Includes All Modern Facilities



Protected Indoor Loading Is Done at the New Galesburg Terminal

benefits. By eliminating the necessity for the driver to speed, a source of many accidents is removed. Schedules are maintained, not by fast running, but by seeing to it that the departure time is met in dispatching trucks from the terminals. In this operation, there is no such thing as a terminal superintendent expecting the driver to cover up terminal inefficiency by fast and dangerous running.

Terminal dispatch is aided by the fact that the freight division has its own terminals at all cities into which it operates. As a part of this system, a new terminal was opened at Galesburg, Ill., on July 1 of this year. This new brick building covers an area of 23,000 sq. ft., is surrounded by driveways to permit of easy access and departure, and is served by a sidetrack from the railway so that interchange from car to truck will be facilitated. The dock is 140 ft. long by 40 ft. wide, and 24 trucks may be spotted along it at one time. Sliding doors provide for inside, protected loading in inclement weather, and the terminal is equipped with an automatic, thermostatically-controlled heating system. This building, in addition to the loading dock and the general offices, also contains a large refrigerated room for the storage of perishables, which is an important commodity handled by the freight division, all highway units being equipped with refrigeration.

The Human Element

All drivers hired must be between 21 and 35 years of age and must have had at least three years previous experience as truck drivers. Before being employed, each one must take a thorough physical examination, equivalent to that given railway men. In fact, these examinations are now conducted by the local surgeons of the railway. Particular stress is laid upon correct vision, and some 25 per cent of the applicants are turned down because of defective vision, particularly color blindness. Each employee is also given a further thorough examination every year, to see that he maintains himself in proper physical condition after employment.

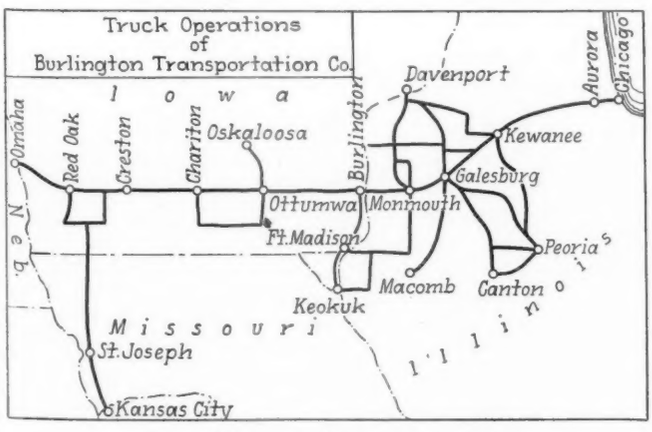
Those who are found by examination to be physically fit are then sent out on student trips with experienced drivers who have shown themselves to be good teachers. Then, if they qualify, they are assigned to the same unit and to the same run, insofar as possible, as a thorough knowledge of the vehicle and of local road conditions has been found invaluable in accident prevention.

The drivers must also familiarize themselves with a detailed book of rules, which covers all possible contingencies. The fact that safe arrival is far more important than on-time arrival is constantly stressed. Any driver is authorized to tie up and report to the dispatcher under unusual weather conditions that would make it hazardous to proceed.

Inspectors are constantly on the road to see that the rules are observed, but, since the drivers are never urged, or even permitted, to violate the rules in order to make up time or for any other reason, the rule infractions are few and far between.

As an example of the clarity with which the rules are issued, rule 63, dealing with crossing railway tracks at grade, is quoted in full below:

Movement over railroad crossings: (a) Operator must STOP, LOOK AND LISTEN in both directions for approaching steam or electric locomotives, trains or cars, before crossing any tracks of a steam or electric railroad at grade. The stop must be made within not less than 10 ft., nor more than 50 ft., from the rail nearest the front of the motor vehicle. This rule must always be observed and a stop made, even if the signal shows clear. (b) Operator must make certain that no train is closely approaching before driving across tracks. In foggy, wet or stormy weather, when visibility is poor, extra precaution must be taken before crossing tracks. (c) If a warning signal or automatic safety device indicates an approaching train, operator must be governed by this warning and will never believe that the signal is out of order, but must always accept it as a danger signal. He will never cross tracks while a warning signal is in action, unless, after a sufficient period, he positively ascertains that no train is approaching. (d) An operator



Over 1,500 Route-Miles Are Operated

must never cross tracks when a train is slowly approaching and warning signals are operating, regardless of the fact that the crossing may be made in plenty of time. Many railroad warning signals are so regulated to start operating for high speed trains that are a long distance from the crossing. (e) Relief from stopping before crossing unused tracks will be granted only by special instructions. (f) When stop has been made within 10 feet of tracks, operator must use low gear in crossing the tracks, and must not shift gears while on the crossing.

Motor Transport Outlined in Annual Reports

Statements show a continuing executive interest in motor transport subsidiaries

HIGHWAY transport is coming more and more to merit a place in the messages which railroad presidents and trustees present annually to their stockholders. But its status is varied, ranging from that of a full-grown operating affiliate to that of a corporate "cinderella," claiming only vague mention in the table devoted to investments. In culling the 1936 crop of railroad annual reports, material has been selected from the presidential reports themselves and from the statistical tables which customarily follow.

Daniel Willard of the Baltimore & Ohio devoted a paragraph to the 20 new motor buses with which his company replaced the older vehicles furnishing passenger and baggage connections between trainside at the Central of New Jersey terminal at Jersey City, N. J., and 14 motor coach stations located at strategic points in New York and between the railroad station at Elizabeth, N. J., and the Newark, N. J., coach depot. These new vehicles are streamlined and air-cooled.

The Reading reported no changes in motor coach or truck route mileage during 1936 for its motor carrier affiliate, the Reading Transportation Company, but noted the purchase of two additional motor trucks. The major theme of the motor transport discussion was the approval by the Board of Public Utility Commissioners of New Jersey and the Public Service Commission of Pennsylvania of a plan for the unification and consolidation of the Reading affiliate with the Jersey Central Transportation Company, a wholly-owned motor subsidiary of the Central of New Jersey, which railroad is, itself, a subsidiary of the Reading. The consolidation is to be effected by the acquisition by the Reading Transportation Company of the entire capital stock of, and equipment owned by, the Jersey Central Transportation Company and by the transfer to the Central of New Jersey of 15 per cent of the interest now held in the Reading highway subsidiary by the Reading Company.

The report of the Bangor & Aroostook contained an income account consolidating figures on railway operation with that of affiliates, including the Bangor & Aroostook Transportation Company. The income statement reveals that the gross revenues from the affiliates alone, including motor bus operations, totaled $31,017, and net income totaled $15,139.

President H. S. Palmer of the New York, New Haven & Hartford reported that, excluding those organizations which operate highway services merely as supplementary to urban and suburban electric railway facilities, the New Haven affiliates which carry on motor transport operations comprise the New England Transportation Company, the Soundview Transportation Company, the County Transportation Company and the Berkshire Street Railway Company, all of which corporations are afforded separate income accounts and balance sheets in the New Haven's annual report. A net deficit of $83,003 was reported in the New England Company account for 1936, as compared with a $220,648 loss for the preceding year. While operating revenues totaled $3,515,405 in 1936, a decrease of some $93,887 from those of 1935, this loss in traffic was more than offset by a cut in operating expenses of $226,455 from the 1935 total, operating expenses for 1936 totaling $3,163,995, including depreciation and retirement costs of $223,637, which gave the company a net operating revenue of $351,410, a $132,568 increase over 1935. In the operating revenues for 1936 quoted above, passenger receipts, comprising the greater part of the total, contributed $2,132,958, a decrease of $310,533 from the previous year, while revenues from freight and miscellaneous services, totaling $1,382,348, comprised a $216,646 increase over revenues of the same class in 1935. Tax accruals of $287,133, an increase of $5,337 over 1935, reduced the operating revenues to $64,277, while non-operating income of $9,708, an increase of $1,072 over 1935, raised the gross income to $73,985. A decrease of $8,083 in deductions from gross income, or total deductions of $156,989 (including $79,110 interest accruing to the New Haven) further explains the reduction in net deficit over 1935's loss, stated above. The balance sheet as of December 31, shows total assets of $5,474,488, a decrease of $504,009 from that given for 1935. The parent railroad's investment in the company remained as at the close of the previous year, a total of $2,818,500, made up of the entire $1,500,000 issue of the subsidiary's stock and $1,318,500 (par and book value) of the outstanding notes, pledged as security for loans.

President French of the Boston & Maine, while stating that his road's separately-operated property loss increased $16,097 by reason of the absorption of the 1936 deficit of its highway subsidiary, the Boston & Maine Transportation Company, also stated that this deficit was "offset many times in the railroad's expense account through economies resulting from the substitution of buses and trucks for unprofitable rail service." He re-

ported that his road has set up within the freight traffic department a merchandise section to specialize in the handling of l.c.l. shipments and "co-ordinate all the agencies of the railroad having to do with the solicitation and movement of this class of traffic." By this means he hopes to reclaim for the rails, merchandise traffic now moving over the highways.

As president also of the Maine Central, Mr. French pointed to the $75,246 earned in 1936 by its highway subsidiary, the Maine Central Transportation Company, which constitutes a decrease of $11,051, as compared with 1935 income, resulting from a reduction in fares by the subsidiary, made necessary by the reduction of eastern rail fares, effective June 1, 1936, and consequent drops in the rates of competing independent highway carriers.

While no mention was made of motor transport in President Williamson's statement, the investment account of the New York Central revealed that the road holds 100,000 shares out of a total of 200,000 outstanding shares of the Central Greyhound Lines, Inc., having a ledger value of $20,233.

The report of the trustee for the Fonda, Johnstown & Gloversville, which operates bus and electric street and interurban railway services directly, showed that operating revenues from motor bus operation totaled $86,193, an increase of $10,410 over the previous year, and that 12 buses were purchased during the year, which brought the total, on December 31, to 25 vehicles.

Southern Lines

In the statement of H. D. Pollard, receiver for the Central of Georgia, there appeared a notation of a decrease of $6,000 in loans and advances to the Central of Georgia Motor Transport Company, a highway subsidiary. In the table of investments of the road, there appeared information that the road holds the entire issue of 5,000 unpledged shares of the subsidiary's capital stock, on which no dividends were paid during the year.

While no reference was made to highway transport in the president's statement for the Richmond, Fredericksburg & Potomac, the compilation headed "Investment in Affiliated Companies" contained the statement that the road holds $105,000 worth of stock of the Richmond Greyhound Lines, Inc., and made advances totaling $44,100 to the company during 1936. Further reference was made to holdings in the Richmond, Fredericksburg & Potomac Transportation Company to the amount of $90,000 (par and book value) and advances of $14,000 made during the year.

President Tigrett of the Gulf, Mobile & Northern reported that during the year a highway subsidiary called the Gulf Transport Company was formed, with a total capital stock issue of $10,000, all of which is owned by the road, with the exception of directors' qualifying shares. He announced that the new company will provide services auxiliary to rail operations, including passenger service in rail territory, and the handling by truck of freight shipments in connection with rail operation and also as an independent carrier, and stated that on December 31, the company owned 7 buses and 4 trucks.

In the report of the Illinois Central, it was shown that the road owns the entire 500 outstanding shares of the Central Transportation Company (Delaware) and the entire 50 shares of the C. T. C. (Illinois). The railroad also owns all of the 200 shares outstanding of the Mississippi Transportation Company, Inc., and the entire 6,000 shares of stock of the Mississippi Valley Company. Advances to highway affiliates include $2,699,187 to the Mississippi Valley Corporation, as of December 31, an increase of $1,731,673 over the previous year, and $5,128,952 to the Mississippi Valley Company as of December 31.

Canadian Lines

The report of the Canadian Pacific showed that the road holds capital stock of the Canadian Pacific Transport Company, Ltd., to the amount of $50,000 par value and owns $187,500 worth of shares in the Pennsylvania-Ontario Transportation Company.

As shown in its investment account, the Canadian National holds all of the 500 outstanding shares of the capital stock of the Canadian National Transportation Company, Ltd. This road also has a direct interest in the Central Vermont Transportation Company to the amount of $50,000 in stock, or one-quarter of the entire $200,000 outstanding. The remainder is held by the Central of Vermont, itself a subsidiary of the Canadian National.

Southwestern Lines

G. A. Thomson, trustee for the Missouri Pacific, reported that at the end of the year the Missouri Pacific Transportation Company owned 159 units of passenger-carrying equipment, compared with 136 units at the close of 1935. He stated that two additional franchises were acquired during the year, one from the White Line Stage Lines, operating from Kansas City, Mo., to Lexington, Mo., a distance of 42 miles, and another from the Dardanelle Transfer Company with right to operate between Paris, Ark., and Morrilton, a distance of 41 miles. Further rearrangements of routes and changes in highway location, however, resulted in a decrease of 97 miles in route, leaving 5,071 miles of highway service at the end of the year. The road holds 1,000 shares of the highway subsidiary's stock at $100 par value per share, and, as of December 31, had made advances to the company totaling $614,623. Assets of the transportation company include $2,877,971 in notes receivable from the Missouri Improvement Company, a wholly-owned subsidiary of the parent railroad, shown by the books to have been received in exchange for certain shares of Missouri Pacific stock and for a portion of International-Great Northern adjustment mortgage bonds.

President Johnston of the Kansas City Southern referred to the K. C. S. Transport Company, Inc., as an organization formed to contract for the collection, transportation and delivery of l.c.l. freight. The company owns no equipment or real property and is wholly-owned by the rail carrier through stock possession, amounting to $5,000 face value.

Western Lines

P. H. Joyce, president of the Chicago Great Western mentioned the inauguration of flat car service for highway vehicles early in 1936, suspended for a time by the commission and reinstated between Chicago and St. Paul, Minn., on July 7, 1936. He stated that the road earned revenues of $206,951 from this service up to December 31, and asserted that this traffic represents shipments that moved exclusively over the highways before the inauguration of flat car service.

The Great Northern investment account shows that it holds $884,286 of the common stock of the Northland Greyhound Lines, Inc. The report of the Northern Pacific reveals that the road has a wholly-owned highway subsidiary—the Northern Pacific Transport Company—to which it has made advances totaling $271,500, and from which it received, in 1936, $11,658 in dividends and

interest. Further investment information shows that the road's wholly-owned subsidiary, the Northwestern Improvement Company, holds joint notes of the Yellowstone Park Transportation Company, amounting to $54,400 (par and book value).

President Budd's report showed that the Burlington's highway subsidiary, the Burlington Transportation Company, suffered a loss of $204,749 for the year, compared with a $191,682 deficit in 1935, from passenger services, and earned $20,638 after all charges, on truck operations. Mileage statistics for the company during the year show 10,000,000 bus-miles over a total of 6,451 route-miles and approximately 2,000,000 truck-miles over a total of 1,306 route-miles. Changes and improvements during the year include the acquisition of the Arrow Stage Lines, operating between Omaha, Nebr., and Sioux City, Ia., and the completion of an agreement with the Interstate Transit Lines, highway subsidiary of the Union Pacific and the Chicago & North Western, on January 20, 1937, whereby, in exchange for a stock interest in the company, the Burlington will consolidate its highway passenger service with the operations of the Interstate Transit Lines, subject to approval of the Interstate Commerce Commission. Contracts were also entered for the acquisition of the Bell Transfer Company, operating between Kansas City, Mo., and Chicago and Minneapolis, Minn., and the Sands Motor Express Company, operating between the Tri-Cities and St. Louis, Mo.

In the income account of the Denver & Rio Grande Western, dividend earnings from motor operations totaled $19,900 in 1936, as compared with $7,140 in the previous year. The list of collateral under loans of the road outstanding on December 31, includes 42,000 shares of the outstanding stock of the Denver Colorado Pueblo Motor Way Inc., valued at $42,000, and 1,300 shares of the stock of the Rio Grande Motor Way, Inc., valued at $130,000.

President Bledsoe of the Atchison, Topeka & Santa Fe made no specific references to motor transport operations, but information regarding investment in terminal and collateral companies shows that the road owns 250 shares, or 25,000, of the total capital stock of the Santa Fe Transport Corporation, the entire 110 outstanding shares of the S. F. T. Company (Cal.), to the amount of 11,000, and the entire 10 outstanding shares of the S. F. T. Company (Del.), to the amount of $1,000. Coming to jointly-owned highway subsidiaries, the road holds 500 out of 90,000 outstanding shares of the Southern Kansas Stage Lines Company, and, by ownership of the General Improvement Company, controls 49,720 additional shares. Advances made during the year total $301,510 to the S. F. T. Company of California and $16,500 to the S. F. T. Company of Delaware, and $218,000 to the Southern Kansas Stage Lines Company.

President Gray of the Union Pacific reported that the Interstate Transit Lines, in which his road holds 70.9 per cent interest and the Chicago & North Western holds the remainder, had gross revenues of $3,766,580 during the year and earned $523,984 after all charges. Operating expenses and rents totaled $2,836,767. He further reported, in a separate income account, that the Union Pacific Stages, Inc., (a wholly-owned subsidiary) earned gross revenues of $1,480,579 and had a net of $224,463. Operating expenses and rentals amounted to $6,174,017, and deductions from gross income amounted to $10,027. The Interstate Transit Lines operates highway motor coaches in Union Pacific and Chicago & North Western territory between Chicago and Los Angeles, Cal., while Union Pacific Stages, Inc., operates highway services in Union Pacific territory between Salt Lake City, Utah, and Portland, Ore. Together, these companies purchased five 37-passenger, twenty-five 33-passenger and six 21-passenger streamlined motor coaches during 1936, and have ordered forty-five additional 37-passenger units for delivery in 1937. There are credited to the income account of the railroad dividends amounting to $355,233 from Interstate Transit Lines, compared with $587,070 in 1935, or a decrease in dividend payments of $231,837.

The combination of investment assets of the Southern Pacific shows a 35.87 per cent stock ownership in the Pacific Greyhound Lines, which latter company owns 400 buses and one truck and operates over 8,816 miles of passenger routes, extending from Portland, Ore., south through San Francisco, Los Angeles and San Diego, Cal., to El Paso, Texas, from San Francisco eastward to Salt Lake City, Utah, and from Los Angeles east to Albuquerque, N. M. It is further reported that, while these motor services are operated independently, in certain instances co-ordination of the motor bus schedules with rail service has been effected, and that further co-ordination will be developed when and where conditions warrant. The road also holds a 5.65 per cent stock ownership interest in the Southwestern Greyhound Lines, Inc., which operates a total of 167 motor buses over 5,855 miles of routes in the territory east of Denver, Colo., Albuquerque, N. M., and El Paso, Texas, to Kansas City and St. Louis, Mo., Memphis, Tenn., and Lake Charles, La. As with the Pacific Greyhound Lines, this service is operated independently, but in certain instances has been co-ordinated with rail schedules. An additional 9.62 per cent of the capital stock of Southwestern is held by the St. Louis Southwestern, 87.37 per cent of whose outstanding stock is owned by the Southern Pacific.

In addition to these affiliated companies, the road owns in full certain motor bus organizations which operate a total of 82 motor buses and 4 freight trucks, serving approximately 617 miles of bus and truck routes in Los Angeles and vicinity. As part of its l.c.l. store-door service, the road owns in full trucking and transport organizations at various points along its rail lines. These companies, on December 31, owned 135 motor trucks, 110 trailers, 58 commercial tractors and 1 auto-bus and operated 6,037 miles of highway truck routes, performed drayage service in 19 cities and pick-up and delivery service at 876 stations on the rail lines.

Separate income accounts are given for the Pacific Greyhound Corporation (now Pacific Greyhound Lines) and Southwestern Greyhound Lines. The former had net income, after all charges, of $1,651,099 in 1936, a decrease of $63,369, or 3.7 per cent as compared with 1935 operations. Gross revenues totaled $8,142,058, while operating expenses reached $4,780,204. Taxes were $1,249,768, and depreciation and retirement costs comprised $481,713.

Southwestern Greyhound Lines earned net income of $740,346 in 1936, after all charges, an increase of $129,778, or 21.26 per cent, as compared with 1935. Gross revenues amounted to $4,630,368; operating expenses were $3,087,829; taxes, $585,840; and depreciation and retirement, $253,384. The report stated that at the close of 1936, by authority of the Interstate Commerce Commission and regulatory bodies of the states concerned, all of the assets of Pacific Greyhound Corporation and Pacific Greyhound Lines, Inc., and inactive subsidiaries, through transfers and merger were combined in a surviving corporation which was renamed Pacific Greyhound Lines. This latter company assumed the entire capital stock structure of Pacific Greyhound Corporation. As of December 31, the Southern Pacific owned 39.05 per cent of the common stock and 22.78 per cent of the preferred stocks of the Pacific Greyhound Lines.

The motor transport companies, whose operations are summarized above and which perform pick-up and delivery services for the Southern Pacific, comprise the Pacific Motor Transport Company, operating in Oregon, California, Nevada and Arizona; the Southern Pacific Transport Company, operating in Texas; and the Southern Pacific Transport Company of Louisiana. These companies earned gross revenues of $5,595,718, or 20.93 per cent more than was earned in 1935. Operating revenues of Pacific Motor Truck Company, another subsidiary operating in Oregon, California and Arizona, were $972,852, an increase of 56.29 per cent over 1935. This company, under contracts with independent motor truck operators, also provides over-the-highway freight service which, on December 31, extended over 6,036.5 miles of highway.

M-K-T Shop Buses

THE Missouri-Kansas-Texas, which has been motorizing its shops and storehouses by the purchase of highway trucks, has also motorized the transportation of its employees to and from such shops and storehouses. The accompanying illustration shows one of the new buses purchased to eliminate shuttle-train service at various shop points throughout the M-K-T system.

New Bus Purchased by the M-K-T for Transporting Its Employees To and From Work

Bus Group Issues Statistics

THE National Association of Motor Bus Operators, a trade organization of motor coach owners and operators, formerly known as the Motor Bus division of the American Automobile Association, has recently issued a statistical analysis of the industry entitled, "Bus Facts for 1937." Presenting, in each category, a picture of the bus field as of January 1, 1937, the compilation contains information from available important sources concerning vehicle ownership, extent of use as subsidiary service to rail transport, foreign trends, corporation and fuel taxation, and a survey of state regulation. A statistical survey of ownership of highway vehicles shows that the number of steam railroads operating buses has declined from 71 in 1934 to 62 in 1935, with a slight rise to 63 in 1936. At the same time, there is revealed a steady upward trend in railroad ownership of buses. Figures on route mileage show a decided increase in the use of highway transit by the carriers; in 1933, the roads operated motor coaches over 11,850 route miles, increased their coverage to 23,450 in 1934, and still further to 45,254 in 1935. The next year saw a slight drop in mileage to 44,000. The statistics summarized above are also broken down into reports on individual states, elsewhere in the booklet.

Safe Driving

A LARGE majority of the men in charge of the 10,000 motor trucks of the Railway Express Agency have won safe-driving merit cards for two years in succession. In some instances, individual express truck drivers have maintained "no accident" scores for periods of 10, 15 and even 20 years, although the slightest mishap is classed as an accident.

Under the safe-driving plan, safety committees are formed by local express employees at principal points, with the agent as chairman and various branches of the service having representatives. These committees meet regularly to study all mishaps reported and give each employee involved an opportunity to be heard as to his personal responsibility for what happened. This leads to a description of the situation he faced and a discussion as to just how the accident could have been avoided. Officials make their own investigation, to determine the cause and take steps to prevent a repetition.

Express drivers have had the importance of careful driving kept constantly before them since the days when express vehicles were drawn by horses. When motorization of street express equipment was completed over seven years ago, this subject became a regular feature of their training. Men driving express trucks are constantly under supervision as to their competence for this type of work and particular attention is paid to their eyesight, hearing and mental reflexes. It is also a fixed rule in the express garages not to send out any vehicle on the streets that is not in perfect mechanical condition.

NEWS

Three Roads Oppose Sale of R. I. A. L. to L. & A.

Holding that the proposal of the Louisiana & Arkansas to acquire the Rock Island, Arkansas & Louisiana is unwarranted in that it would establish a new and unnecessary trunk line in the southwest, the trustees of the Missouri Pacific, the Illinois Central and the St. Louis Southwestern have filed briefs with the Interstate Commerce Commission urging that it deny the proposal of the L. & A. All of the roads joining in the protest asserted that proposed merger would cause a diversion of traffic from the existing routes, resulting in increased costs and poorer service.

In its brief the Cotton Belt said that the proposed acquisition would:

Give the L. & A. domination of a vast territory just beginning its development; place the L. & A. in a position to trade traffic with connections, substantially reducing their divisions; create no new traffic; and dismember the Rock Island system, contrary to the commission's plan of consolidation.

The Illinois Central asserted that the real purpose of the L. & A. is to establish itself as a more effective competitor for traffic between the New Orleans-Baton Rouge district on the one hand and Memphis, St. Louis and beyond on the other.

The trustees of the Missouri Pacific said that "We are warranted in making the statement that, in our opinion, if a carrier desirous of increasing its revenues may in a proceeding such as this dismember a railway system undergoing reorganization under said Section 77 there has been a failure of the purpose of that statute."

The Rock Island, Arkansas & Louisiana is now a part of the Chicago, Rock Island & Pacific system, which is being reorganized under Section 77 of the Bankruptcy Act. The proposal to sell the RIAL to the L. & A. is supported by the principal bondholders of the RIAL, but is opposed by the Rock Island.

To Provide Commuters' Shopping Service

A "commuters' shopping service," through the medium of order booths located in various New York railroad terminals and distribution of order blanks on rush-hour trains, is expected to be available by October 1, under the management of the Railroad Advertising Company, New York. Under the plan, shopping booths will be set up at Grand Central terminal, Pennsylvania station, and Atlantic Avenue station (Brooklyn terminal of the Long Island R.R.), where representatives will collect orders from commuters on their morning in-bound trips, and relay them to various department stores advertising in suburban stations and trains which, in turn, will distribute the goods so ordered by mail and private delivery service. The order blanks will be made available on all suburban trains.

To stimulate the new service, a weekly "shoppers' guide" containing announcements of merchandise offerings of advertisers will be placed in racks at the ends of commuters' cards for distribution to passengers, and increased display space in station and terminals will be devoted to advertisers participating in the plan.

Brotherhoods Prepare For Strike

Wage negotiations between the railroads and the operating brotherhoods broke down on August 25, when the carriers announced that their operating costs had reached a "saturation point" with the result that they could not grant a wage increase at this time. The five unions participating in the negotiations said that the carriers' action left them "no alternative than to set the day and hour for the men to withdraw from service," in accordance with the authority already given in a strike ballot in which 97 per cent of the workers voted in favor of a strike. In this event, the Mediation Board could declare that an emergency exists and bring the matter to the attention of the President, who may then appoint a fact-finding board which would have 30 days in which to render a report.

Denison Act Application Denied

The Interstate Commerce Commission, Division 4, has denied the Denison Act application of the Bell Coal & Navigation Company for a certificate of public convenience and necessity covering operation by it as a common carrier by water on the Tradewater and Ohio rivers. The commission held that the only tonnage which the applicant definitely shows would be handled by it is the coal produced by its own mines at Scottswood, Ky.; and, while the decision conceded that "a carrier may be a common carrier even though most of its traffic consists of its own property," it nevertheless insisted that "there must be some appreciable use or reasonably prospective use by the public, or else the holding out to carry for all becomes merely an empty form."

Injunction Proceedings Against P. R. R. Linden Spurs

Judge Philip Forman, in federal district court at Newark, N. J., issued an order on August 23 directing the Pennsylvania to show cause on August 27 in federal court at Camden, N. J., why a preliminary injunction should not be granted restraining further construction by the road of several spurs to a new industrial area located on the east side of its main line in Linden, N. J., including a line from Avenel on its Perth Amboy branch.

The order was granted subsequent to the filing of petitions seeking restraint by the Central of New Jersey and several residential property-owners of Avenel. The first petition directed its plea on the contention that the Pennsylvania has not been granted authority for the spur by the Interstate Commerce Commission, while the second was based on the fear of declining values in property adjacent to the new line.

These proceedings follow a dispute between the two roads of some duration, arising from the desire of each to tap the growing industrial area of Linden, wherein the General Motors Corporation recently completed a $5,525,000 plant and in which other important industries are expected to locate. The Pennsylvania has already completed a yard and spur tracks connecting the General Motors plant with its adjacent New York-Philadelphia main line, but in November, 1936, following a similar step by the Central of New Jersey in regard to connections from its Perth Amboy line, filed notice with the Secretary of State, at Trenton, of its intention to construct several spurs to serve a more extended area from its own Perth Amboy branch at Avenel. No visible further step was taken by either road until about July 12, when each undertook construction of a spur westwardly across the meadows near the Standard Oil refineries in the direction of the Linden area. Upon reaching state highway 25, which bisects the meadows into an east and west section, the construction gangs ceased laying track—the Pennsylvania crews because construction of permanent bridges across the highway cannot be undertaken prior to widening of the artery at an undetermined time in 1938, and the Central gang because the road held, as it alleged, no intention of crossing the highway. On August 4, the Pennsylvania was granted permission by the state highway commission to construct a temporary bridge across the highway.

If granted, the injunction sought will cease construction on, and operation of, all the Pennsylvania's new spurs built and

proposed to the newer industrial area, with the exception of those tracks serving the General Motors plant directly from the main line, which are already in operation and remain uncontested.

In protesting the failure of its fellow railroad to obtain the commission's permission for the new lines, the Central of New Jersey holds that the line from Avenel should properly be held to be an extension, in view of its length, and that a great part of the lines under construction enter territory already served by another road. Its own line to the area it holds to be a spur track only, which does not come under the commission's jurisdiction.

Koach to Retire as Manager Ticket Protective Bureau

H. A. Koach, manager of the Railway Ticket Protective Bureau, with headquarters at Chicago, will retire on October 1 under the provisions of the Railroad Retirement Act. A native of New York, Mr. Koach was born on August 1, 1865, and entered the service of the bureau in 1903, as assistant to the chairman. Since 1934 he has had the title of manager.

Mediation Board's Report on Wage Case

The National Mediation Board has made public its formal report on the settlement of the recent case wherein the 14 non-operating railroad unions were granted a wage increase of five cents per hour in lieu of their demand for a 20-cents-per-hour raise. The report, after sketching briefly the history of the case (No. A-395) and the Board's activities therein, closes with listings of labor's demands and the terms of settlement.

June and First Half Export Figures Show Rise

During June, United States railway equipment builders made export deliveries totaling $824,314 in value, according to the Bureau of Foreign and Domestic Commerce. This constitutes an increase of $98,097 as compared with May, 1937. Exports for the first six months of 1937 totaled $4,799,579, an increase of $1,283,912 as compared with the corresponding period of 1936. Shipments of railway equipment and supplies to United States territories during June, 1937, amounted to $14,734, a decrease of $2,965 from June, 1936.

New Equipment Installed

Class I railroads in the first seven months this year installed 41,630 new freight cars, the largest number for any corresponding period since 1930, according to the Association of American Railroads. In the same period last year, 14,914 new freight cars were put in service, and 2,272 in the same period two years ago. New freight cars put in service in the first seven months of 1930 totaled 55,660. Of the new freight cars installed, coal cars totaled 22,039; box cars, including both plain and automobile, 15,354; refrigerator cars, 3,241; flat cars, 844; stock cars, 150; and miscellaneous cars, two.

Class I railroads in the seven months of 1937 also installed 198 new steam locomotives and 25 new electric and Diesel locomotives, the number of new steam locomotives put in service being greater than for any corresponding period since 1930. In the same period in 1936, 26 new steam locomotives and 14 new electrics and Diesels were put in service, and 27 steam locomotives and 99 electrics were put in service in the same period in 1935.

New freight cars on order on August 1 totaled 38,089, compared with 27,151 on August 1, last year, and 2,174 on August 1, 1935. New steam locomotives on order on August 1 totaled 283, compared with 65 on the same date one year ago, and four on the same date two years ago; new electrics and Diesels on order on August 1 totaled 29, compared with 20 last year and four two years ago.

New freight cars and locomotives leased or otherwise acquired are not included in the above figures.

Golf Trains—Correction

The reference made to the Boston & Maine's golf train in the August 7 issue of *Railway Age*, page 173, erroneously characterized the service as the first all-expense golf train. Information subsequently received points to the fact that the Illinois Central first operated an all-expense spring golf training tour from northern points on the system to the Mississippi Gulf coast, New Orleans, La., and Memphis, Tenn., in March, 1925. Similar tours were operated annually since that date until 1935. Pamphlets advertising the service, however, show that, unlike the Boston & Maine's tour, green fees were not included in the all-expense charge.

Pacific Coast Strike Didn't Suspend Demurrage Tariffs

The Interstate Commerce Commission, Division 2, has found that demurrage rules and charges at north Pacific ports were applicable and reasonable, notwithstanding interference incident to the 1934 longshoremen's strike at those ports. The complainants in the case (No. 27217—Balfour, Guthrie & Company, Limited, et al., vs. Chicago, Milwaukee, St. Paul & Pacific Railroad Company et al.) did not assail the rates of demurrage, but directed their case solely against the failure of the rules to provide exemption from demurrage charges under strike conditions. Commissioner Aitchison dissented, holding that the demurrage tariff might be wholly reasonable in normal times, but "unreasonable, and hence unlawful, when the normal processes of commerce and transportation were wholly frustrated by lawlessness and irresponsible intermeddling."

New Swedish Route Opened

The Swedish State Railways has recently opened a 1,300-kilometer (806-mile) inland line extending north from Kristenhann to Gaelvare, according to the Railway Gazette (London). Although construction on the line began in 1907 as a military measure to supplement the coastal north-south route with a parallel line less subject to attack, the new railway, called the Inlandsbanan, will be important in colonization of the forest areas in the northern part of Sweden. Most of its traffic will be local in character, as through movements will continue to follow the coastal line between Stockholm and Haparanda. Cost of construction totaled 206 million kroner (approx. 54 million dollars).

Tax Commissioners to Meet

The Western Association of Railway Tax Commissioners will hold its next regular meeting on the morning of September 14 at the La Salle Hotel, Chicago. Luncheon will be served after the meeting.

Rail-Ferry Service Demonstrated to Traffic Men

An unusual entertainment program whereby members could become acquainted with rail-ferry service was arranged by the Junior Traffic Club of Chicago on August 14. On this day a Chicago, Milwaukee, St. Paul & Pacific special train of air-conditioned lounge coaches carried 225 members and guests to Milwaukee, Wis., where they were transferred to a Grand Trunk car ferry which sailed across Lake Michigan to Muskegon, Mich. During the crossing an orchestra furnished music for dancing. After several hours in Muskegon the members were ferried back to Milwaukee, from which point the special train carried them back to Chicago.

N. Y. Rate Rise on Farm Shipments Suspended

Proposed increases in freight rates on domestic fresh fruits, vegetables and hay filed by various roads in New York state have been suspended by the New York Public Service Commission and the Interstate Commerce Commission, which have ordered a joint hearing to be held on September 28 in Washington, D. C. The carriers filed tariff schedules, which were to become effective August 15, to cancel the alternative application of class rates on domestic fresh fruits, vegetables and hay and to establish certain new individual and joint rates and charges, and new individual and joint regulations, practices and classifications affecting such rates and charges.

Would Grant Certificate to U. P. Affiliate

Joint Board No. 92, composed of Mike P. Conway of Iowa, has recommended in a proposed report that the Interstate Transit Lines, highway affiliate of the Union Pacific, be authorized by the Interstate Commerce Commission to operate bus services over an additional route between Des Moines, Iowa, and Marshalltown. The new route, over recently-improved highways, is 51 mi. in length, 18 mi. shorter than the present Interstate route between the same two points, via Ames, Iowa. The Board would also authorize the applicant to conduct special or charter operations from the territory served by the proposed route to any point within the United States.

British Enginemen Accept Wage Award by Narrow Margin

By a close and hotly contested vote, the Associated Society of Locomotive Engineers & Firemen (Great Britain) accepted on August 25 the wage decision handed

down by the Railway Staff National Tribunal on August 11, restoring, in part, pay cuts permitted the carriers in 1931. The tribunal failed to grant the original demand of the unions for a 50-shilling (approx. $12.50) weekly minimum and holidays and vacations with pay.

Of the three unions, the National Union of Railwaymen has already accepted the decision, while the Railway Clerks' Association has yet to consider the tribunal's award.

B. & O. Capitol Limited Now Hauled by Diesels

The 773-mi. Washington, D. C.-Chicago run of the Baltimore & Ohio's Capitol Limited is now made in both directions with a Diesel-electric locomotive, the road having assigned its first two 3,600-hp. Diesels to that service. This, the B. & O. statement says, is the first time in eastern railroad territory that a long-distance train has been "powered in both directions by Diesel-electric drive." Two more of the 3,600-hp. Diesels will be delivered to the B. & O. within a few months.

Prior to the assignment of both to the Capitol Limited, one of the two Diesels hauled the Royal Blue on its daily round trips between Washington and New York, while the other went out of Washington at the head of the Capitol Limited every other day for the run to Chicago. One of these engines recently made "the longest non-stop run in eastern railroad history"—551.4 mi. from Cincinnati, Ohio, to Washington.

The Motor Rail-Car Celebrates Fiftieth Anniversary

The internal-combustion motor-rail car celebrates its 50th anniversary this year, according to an editorial appearing in the August 13 issue of the Railway Gazette (London). On July 11, 1887, a small passenger coach and a freight truck, each powered by a vertical single cylinder Daimler gasoline engine, developing about 1½ hp., completed trial runs between Esslingen and Kirchheim, in the state of Wurttemberg, reaching a maximum speed of 13 m.p.h. This first passenger motor rail-car was a four-wheel light-weight coach having covered platforms. A contemporary newspaper account called attention to the fact that the power equipment in both cars consumed very little space.

Fourth Section Decisions

Several applications for fourth-section relief have been disposed of by the Interstate Commerce Commission during the past week. Applications granted included those relating to rates on sugar in carloads from Philadelphia, Pa., Brooklyn, N. Y., and New York to Newport News, Va., Norfolk, Norfolk Yard, Port Norfolk and Portsmouth; lumber and related articles from points in Maine and Canada to destinations in Official territory; automobiles and parts in carloads from Buffalo, N. Y., to points in New England, Trunk Line and Central territories; export, import and coastwise shipments of vegetable cake, vegetable meal and cottonseed hulls between Texas ports and points in southwestern, north-central, west-central and mountain-Pacific regions; and canned grapefruit and citrus fruit juices in carloads from points in Florida to destinations in southwestern territory.

Fourth-section relief was denied as to rates on cement and iron and steel articles in carloads from southern producing points to south Atlantic and Gulf ports.

Accounting for Social Security and Pension Taxes

The Interstate Commerce Commission, Division 4, has ordered that Accounting Bulletin No. 15, Interpretations of Accounting Classifications, Prescribed by the Interstate Commerce Commission, for Steam Roads effective January 1, 1918, be amended by the addition of the following:

CASE 296

Query:

(A) In case taxes assessed under the provisions of the Social Security Act and the Carriers Taxing Act of 1937, based on the payroll of the carriers' employees, are added to the cost of labor performed for others, what is the proper accounting,

(a) In connection with joint facility arrangements

(b) For work not involving joint facility arrangements?

(B) Shall these taxes relating to the pay of the carriers' own employees while assigned to addition and betterment work be included in the investment in road and equipment accounts?

Answer:

(A) (a) Such amounts added by the creditor company shall be credited by it to account 508, "Joint facility rent income," and shall be charged by the debtor company to account 541, "Joint Facility rents."

(b) Such amounts added by the creditor company shall be credited by it to account 143, "Miscellaneous," and shall be included by the debtor company (if a common carrier) in the accounts appropriate for the cost of the work performed.

(B) No part of these taxes assessed against the carrier shall be included in the investment in road and equipment accounts.

Probe of Charges for Protection of Perishables Against Cold

The Interstate Commerce Commission on August 19 gave notice of hearings to be held next year in connection with its investigation of charges for protective service against cold to perishable freight from and to all points of origin and destination in continental United States. The investigation, "with a view to prescribing such just and reasonable charges . . . as may appear to be warranted," will also go into the cost of such protective services.

All railroads are respondents, as are the Pacific Fruit Express Company, the American Refrigerator Transit Company, the Burlington Refrigerator Express Company, Merchants Despatch, Inc., the Western Fruit Express Company and the Fruit Growers Express Company. While it is not contemplated that hearings will be held prior to January 1, 1938, the notice was given at this time "in order that all parties concerned may have ample time in which to prepare such data as they may consider desirable and necessary for presentation in evidence."

Federal Court Sustains I. C. C. Warehouse Order

The order of the Interstate Commerce Commission, stipulating discontinuance by the Baltimore & Ohio, Central of New Jersey, Delaware, Lackawanna & Western, New York Central, Lehigh Valley, Erie, and Pennsylvania roads of granting alleged less-than-cost warehouse privileges to shippers, and in the case of two of the carriers, of subsidizing affiliate warehouse companies, originally handed down on June 8, 1936, and superseded, after rehearing, by a similar order issued on February 2, was sustained on August 25 by a special, statutory three-judge court consisting of H. B. Chase, of the United States Circuit Court of Appeals, and R. P. Patterson and Murray Hulbert, both of the federal district court. The carriers' case was presented by E. H. Burgess, general solicitor, Lehigh Valley. Opponents of the participating roads comprised representatives of the private storage industry, the commission, the Department of Justice, and the city of Boston, Mass.

The decision is based upon hearings held intermittently since April, when the carriers requested creation of the special court.

Joint Average Demurrage Plan Rejected

The Interstate Commerce Commission, Division 4, has denied the application of the Texas & New Orleans and the St. Louis Southwestern for authority under the provisions of section (5)1 of the Interstate Commerce Act to divide aggregate demurrage revenue under a proposed joint average demurrage agreement with the Interstate Cotton Oil Company of Sherman, Texas. The proposal of the railroads followed the unification of their terminal facilities at Sherman where formerly the only rails serving the Interstate's plant were those of the Cotton Belt, and the latter had operated under an average demurrage agreement with Interstate.

After the unification the T. & N. O. sought to become a party to this agreement, but the commission holds that the unification placed the Interstate plant on the rails of that road, thus leaving the latter with the obligation to collect demurrage and the Interstate with the obligation of dealing directly with both roads. The decision points out that the proposed arrangement would have reduced demurrage payments made by Interstate to the two carriers. Commissioner Mahaffie dissented.

Federal Court Fines Dealers for False Billing

Pleading guilty to charges of a scheme to obtain, through misrepresentation, allowances from certain carriers entering New York through New Jersey gateways, seven New York and New Jersey wholesale egg dealers were fined a total of $11,500 for violation of the Interstate Commerce regulations prohibiting rebates by Judge Philip Forman, in the Federal District Court at Trenton, N. J., on August 20. According to the brief of William Smith, assistant United States attorney, who entered the charge, the defendants, by falsification of shipping papers, have been obtaining what virtually amount to rebates on egg shipments received at stations on the New Jersey shore, opposite New York City.

In view of the time and costs involved in lighterage movements on goods destined for New York and Brooklyn, the roads terminating at the New Jersey shore grant an allowance of three cents per hundred-

Continued on next left-hand page

MODERN

POWER . .

"Modern locomotives" signify not only modern design but the incorporation in that design of proved factors of economy and capacity.

Such locomotives have minimum weight on driving axles; low dynamic augment; high starting and accelerating capacity; high sustained capacity at high speeds.

These characteristics mean lower operating costs, higher earning capacity and greater net earnings. In many cases they also postpone indefinitely expenditures for heavier track and bridge construction.

LIMA LOCOMOTIVE WORKS

LIMA LOCOMOTIVE WORKS INCORPORATED

INCORPORATED, LIMA, OHIO

weight to New York consignees of fresh meats, poultry, butter, eggs, and other perishables who prefer to receive their shipments at New Jersey stations and truck them privately to New York and Brooklyn points, with the provision that the actual destination of the goods be within the latter points. In filing for allowances under this "in lieu of lighterage" tariff, the defendants misrepresented the destination of their shipments, since they actually sold the eggs in New Jersey from warehouses located in Jersey City, N. J.

N. Y. Roads Praised for Employee Record System

The railroads of New York state have been commended by Elmer F. Andrews, industrial commissioner of the State Department of Labor, for the manner in which they have co-operated with the division of placement and unemployment insurance of the department in instituting the punch card system for supplying employee payroll data requisite to the administration of the state unemployment insurance law. Most of the large roads in the state adopted the system, including the Pennsylvania, Long Island, Delaware & Hudson, New York, Chicago and St. Louis, Erie, and the New York Central.

"Quarterly payroll figures covering approximately 300,000 employees are now being submitted on mechanized tab punch cards, and better than one out of three of these employees are railroad workers," Mr. Andrews said. "These punch cards are saving business dollars for many large employers as well as tax dollars for both the state and federal governments. It is particularly gratifying that the railroads and the Railroad Retirement Board, headed by Mr. Murray Latimer, have been so co-operative."

The information concerning employees' earnings recorded by the punch card system is utilized both by the unemployment insurance division to determine the amount of benefits to which eligible unemployed workers will be entitled after January 1, 1938, and by the Railroad Retirement Board for determining benefit payments from its old age retirement fund.

G. M. & N. Truck Operations

Joint Board No. 165, composed of James G. Pruett, Jr., of Alabama; Alex Grouchy, of Louisiana, and J. D. Miller, of Mississippi, has recommended in a proposed report that the Interstate Commerce Commission grant the "grandfather-clause" application of the Gulf, Mobile & Northern for authority to continue operation as a common carrier by motor vehicle of commodities generally between specified points in Alabama, Louisiana and Mississippi, and of mail, express and baggage between Foxworth, Miss., and Columbia. Several railroads opposed the granting of the application.

In another proposed report in Sub. No. 1 of the same case (MC 87653) Examiner Richard Yardley would deny the application of this road but grant in some respects a similar petition of its subsidiary —the Gulf Transport Company—for authority to operate trucks between specified points in Tennessee, Mississippi, Louisiana and Alabama. The parent railroad sought authority to operate as a common carrier, while the subsidiary's application was for a contract-carrier permit; but, the report says, officers of the two applicants stated that "it would be satisfactory if either a permit or a certificate is granted to one of the applicants and denied to the other."

The examiner's recommendation that a certificate be denied the G. M. & N. is based on his finding that the railroad's charter does not authorize it to conduct motor operations. Of several routes sought in the Transport Company's application the report would grant permits for four and deny the application in other respects, the denials to be based in the main on the fact that the proposed routes would carry the subsidiary's trucking operations outside G. M. & N. territory.

Truck Loadings Declined in July

"Due to seasonal operations, plant shutdowns for inventories and labor difficulties," the movement of commodities by trucks in July dropped 6.42 per cent in volume compared with the June tonnage, according to the monthly compilation of truck loadings issued by American Trucking Associations, Inc. The current tonnage figure, however, represents a gain of 3.89 per cent over July, 1936.

A total of 111 freight haulers by truck, in 28 states and the District of Columbia, filed comparable reports, showing an aggregate of 435,672 tons, as against 465,580 tons in June, and 419,341 tons in July, 1937. These reports, the statement says, "represent the tonnage transported by some of the largest motor carriers, but they are not to be taken as indicating the total volume of freight moved by truck operators for-hire." The loadings index figure—the monthly average for 1936 represents 100—stood at 108.59 for July, compared with 117.91 for June.

The movement of general merchandise, which accounted for about 45 per cent of the total volume reported, decreased 7.85 per cent in July, compared with June, but increased 3.59 per cent over July, 1936. Only in two major commodity groups, petroleum products and tobacco, were the July loadings larger than the June volume. The trend in some of the principal commodity groups is shown by the following figures: Petroleum products, 2.73 per cent over June, 40 per cent over July, 1936; automobiles, 28.23 per cent under June, 25.21 per cent under July, 1936; iron and steel, 5.93 per cent under June, 32.88 per cent under July, 1936; groceries, 15.58 per cent under June, 12.93 per cent under July, 1936; tobacco, 6.49 per cent over June, 10.17 per cent over July, 1936.

Freight Car Loading

Revenue freight car loading for the week ended August 14 totaled 777,382 cars, an increase of 7,676 cars or one per cent above the preceding week, an increase of 40,804 cars or 5.5 per cent above the corresponding week in 1936, and an increase of 163,377 cars or 26.6 per cent above the corresponding week in 1935. All commodity classifications except ore, forest products and grain showed increases over the preceding week, while all commodity classifications except livestock and coal showed increases over last year. The summary, as compiled by the Car Service Division, Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, August 14

Districts	1937	1936	1935
Eastern	151,532	147,375	126,500
Allegheny	156,491	148,439	114,838
Pocahontas	52,604	51,865	41,358
Southern	98,213	98,250	81,804
Northwestern	137,112	124,432	102,521
Central Western	120,028	108,846	97,902
Southwestern	61,402	57,371	49,092
Total Western Districts	318,542	290,649	249,515
Total All Roads	777,382	736,578	614,005
Commodities			
Grain and Grain Products	43,391	42,756	42,921
Live Stock	14,616	15,247	14,278
Coal	116,251	117,033	89,894
Coke	9,769	8,365	4,781
Forest Products	40,932	36,561	30,543
Ore	74,471	56,132	34,971
Merchandise L.C.L.	166,396	165,345	157,878
Miscellaneous	311,556	295,139	238,739
August 14	777,382	736,578	614,005
August 7	769,706	728,371	582,077
July 31	782,660	747,529	595,297
July 24	770,980	730,981	595,572
July 17	770,075	720,359	592,672
Cumulative Total, 33 Weeks	24,287,282	21,621,592	19,176,980

In Canada.—Car loadings for the week ended August 14 totaled 51,006 cars, 47,739 for the previous week and 46,036 cars for the corresponding week last year, according to the weekly statement of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
August 14, 1937	51,006	23,048
August 7, 1937	47,739	23,228
July 31, 1937	49,608	23,838
August 8, 1936	46,036	21,553
Cumulative Totals for Canada:		
August 14, 1937	1,534,290	873,533
August 8, 1936	1,399,619	741,983
August 10, 1935	1,371,563	690,796

Missouri Pacific Must Drop New Orleans-Natchez Bus Line

Competitive relationships between the National Trailways System and the Greyhound Lines were brought into a recent Interstate Commerce Commission decision denying the application of the Missouri Pacific Transportation Company, highway affiliate of the Missouri Pacific, for authority to continue its bus operation between Natchez, Miss., and New Orleans, La. The railroad subsidiary is associated with National Trailways, while its competitor on the route—Teche Lines, Inc.—is a Greyhound affiliate.

Teche Lines was first on the ground, being eligible for a "grandfather-clause" certificate, while the Missouri Pacific Transportation Company established its line on October 15, 1935—"the last day of the period during which this could be lawfully done under the conditions specified" in the Motor Carrier Act. The majority opinion of Division 5, by Commissioners Eastman and Caskie, found "substantial and convincing evidence" that the existing facilities of Teche Lines adequately supply the needs of the territory; and that the granting of the M. P. T. application would result in uneconomic duplication of services.

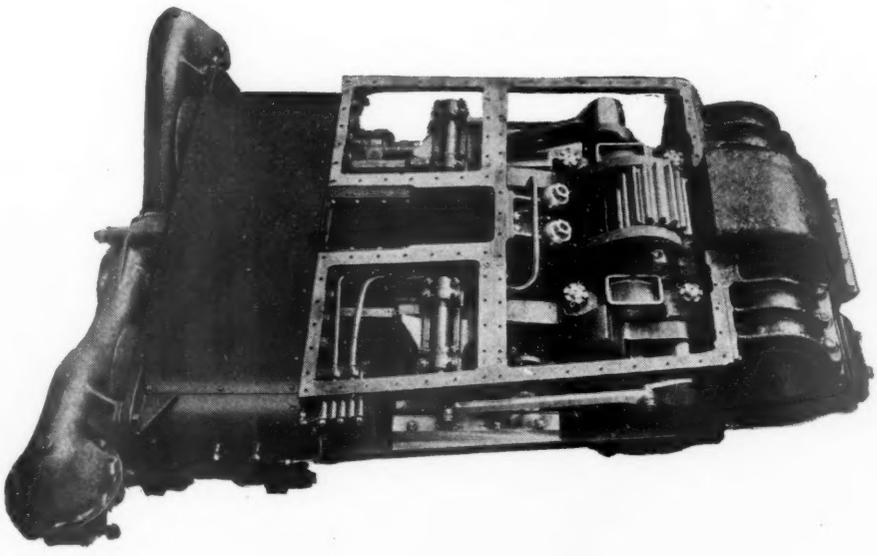
To the M. P. T. contention that Teche

Continued on next left-hand page

UP-TO-DATE LOCOMOTIVE DESIGN

Merely Combining Even the Best of Past Practices Will Not Meet the New Demands on Locomotive Service. New Ideas Must Be Developed, and Here Is One . . .

Railroad Executives are deeply concerned with the effect of high speed train operation on track and bridges. » » » To insure higher safety factors and lower track maintenance costs, the trend is towards minimum weight on locomotive driving axles and reduced dynamic augment. » » » High locomotive horsepower-capacity to haul heavy trains at high speed is practical with minimum driving axle loads by incorporating the Booster in the locomotive design. » » » This provides for the necessary starting power and makes a balanced locomotive that is highly efficient and economical throughout its entire operating range.



FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

favors its Greyhound connections, and thus the competing line should be continued to provide adequate through service via National Trailways, the majority replies that "this is a situation which the act empowers us to correct." Accordingly, it suggests that the applicant "make a test of what can be done in the way of providing convenient and adequate through service" under interchange arrangements with Teche.

"A further reason for the conclusions which we reach," the majority report continued, "is the fact that applicant is controlled by a railroad. The danger of subjecting the Teche Greyhound to the competition of a bus line under such control is shown by the fact that on November 30, 1935, the last date covered by the record, applicant had a cumulative deficit of $1,722,211. Operation at a deficit was made possible by the liberal advances of the controlling railroad. Teche Greyhound apparently has no similar financial support to aid it in a competitive struggle. Furthermore, while we have heretofore found in other proceedings under the Act that railroads should be given the opportunity of using motor vehicles to supply service that is auxiliary or supplementary to their rail service, there is no evidence that the bus line between Natchez and New Orleans would be used for such a purpose. On the contrary, it invades territory of another railroad system. While the Missouri Pacific operates between Natchez and New Orleans, most of its operation is on the west side of the river, whereas this bus line operates on the east side."

Commissioner Lee, in a brief dissent, discussed the advantageous position in which the majority opinion leaves Greyhound in the area involved, expressing the view that "it would be in the public interest to have competitive operation by these two strong systems between New Orleans and the large territory to the east, north and west." The denial of the M. P. T. application, he adds, results in shutting National Trailways out of New Orleans and "in preserving to the Greyhound Lines an apparent, if not an actual, monopoly in bus transportation in the lower valley of the Mississippi."

Seagoing Railway Fast Becoming a Highway

More than 600 previously unemployed men are at work on the transformation of the Florida East Coast's abandoned Key West extension to a vehicular causeway, extending from Lower Matecumbe Key to Big Pine Key in Monroe County, Fla., according to a report made on August 22 to Public Works Administrator Harold L. Ickes. This is the southernmost P.W.A. project in continental United States and was made possible by a loan of $3,600,000 to the Overseas Road & Toll Bridge District.

Key West was first connected to the mainland of Florida when the Florida East Coast inaugurated train service to Key West in 1912, and while all permanent structures were not completed until some years later, trains were operated regularly until September, 1935, when a severe hurricane damaged its tracks to such an extent that train service was suspended following which the Interstate Commerce Commission approved abandonment of the line. Upon abandonment of the railroad the Overseas Road & Toll Bridge District purchased from the receivers for the F. E. C. the railroad property from Lower Matecumbe Key to Big Pine Key for $640,000.

The abandoned railroad bridges and grade will be reconstructed to provide a highway between Lower Matecumbe Key and Grassy Key and between Knights Key and Big Pine Key, which will eliminate the necessity of using ferries between these points. There are 13 miles of bridges and 20 miles of roadway in addition to the 12 miles of highway built by Monrce County from Grassy Key to Knights Key. The railway bridges that are being converted are of three different types—concrete arches, steel plate girder spans and steel trusses with one steel bascule span at Channel No. 5 and a swing span at Moser Channel.

P. R. R. Tests "Roomette" Pullman

For the purpose of exhibition and to determine the reaction of patrons, the Pennsylvania has commenced operation for a limited period on several overnight and long distance trains of a Pullman sleeping car of new design known as the "roomette" car, which was exhibited at the Atlantic City, N. J., convention of the Mechanical division, A.A.R., and described in the *Railway Age* convention daily of June 21, page 1040 D13.

The car has been designed to provide maximum comfort and convenience in night and day travel, combined with efficient utilization of car space and lightweight construction. Each of the 18 "roomette" compartments of the car is a complete, fully enclosed, self-contained private bedroom, convertible to a sitting room for daytime use. It occupies slightly more than the space of a standard Pullman section and contains a single bed 6 ft. 5 in. in length.

The car was operated between Pittsburgh, Pa., and New York from August 12 to 16, and between New York and Washington, D. C., from August 17 to 20. On August 21 it was assigned to the General, operating between Chicago and New York.

It is further announced that the "roomette" feature will be embodied in the Pennsylvania's new light-weight equipment which is expected to be introduced in through east and west service early next year.

During the trial period, the fare for single occupancy of the roomette sections, which are designed primarily for use by one passenger, will be identical with that for single occupancy of a standard sleeping-car section, or 150 per cent of the lower-berth rate, between most points of travel, but with some exceptions.

Equipment and Supplies

LOCOMOTIVES

THE MINNEAPOLIS & ST. LOUIS has ordered two all-steel snow plows from the Russell Snow Plow Company.

THE NIAGARA JUNCTION RAILWAY has taken delivery of a 60-ton Baldwin-Westinghouse electric locomotive. This locomotive was purchased to handle traffic in switching and hauling service; it has four motors, with a total capacity of 540 hp.

FREIGHT CARS

THE CAMBRIA & INDIANA, reported in the *Railway Age* of July 31 as inquiring for 500 hopper cars of 50 tons' capacity, has ordered 500 from the Bethlehem Steel Company and 300 from the American Car & Foundry Company.

PASSENGER CARS

THE PENNSYLVANIA has ordered one dining car from the Edward G. Budd Manufacturing Company.

* * * *

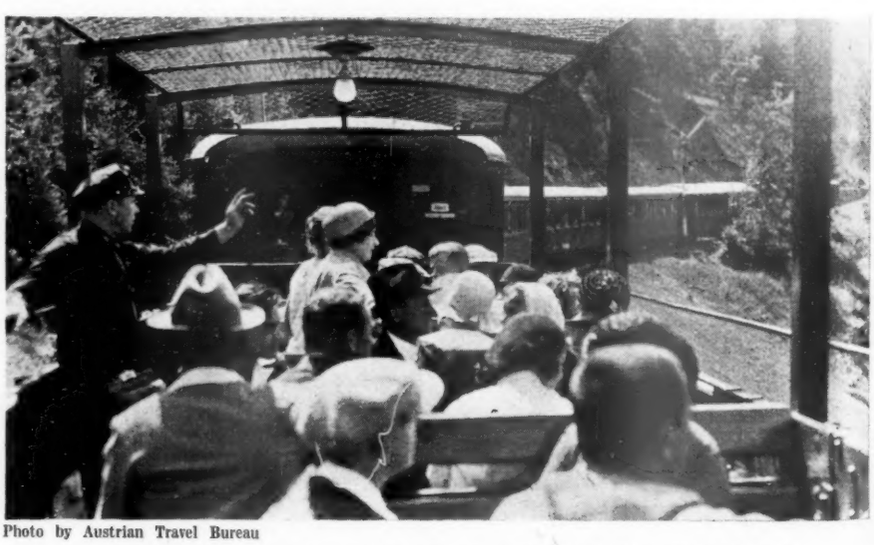
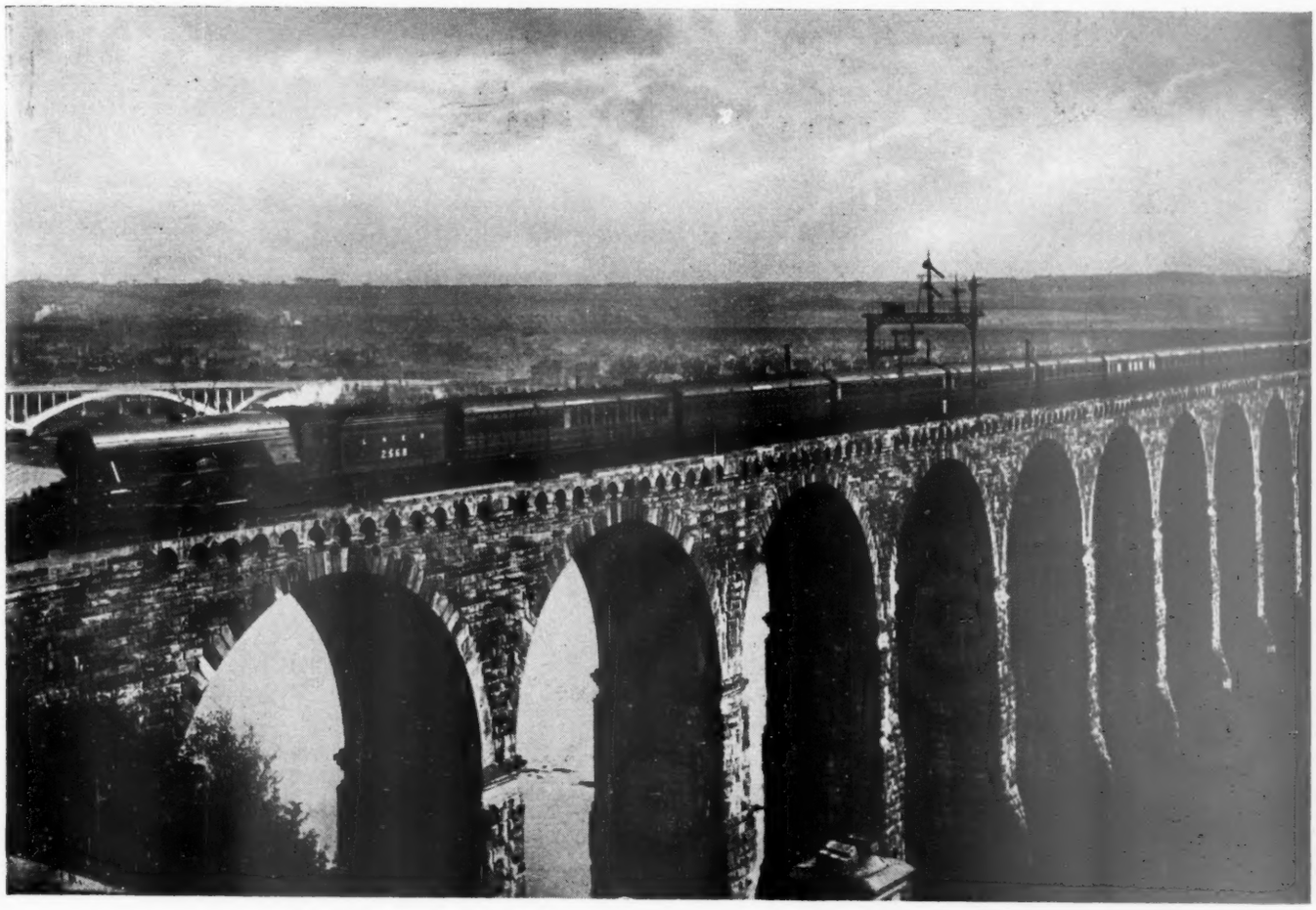


Photo by Austrian Travel Bureau

Open-Air Observation Car on the Austrian Mariazell Narrow-Gage Road

Continued on next left-hand page

NO. 29 OF A SERIES OF FAMOUS ARCHES OF THE WORLD



ROYAL BORDER BRIDGE

BERWICK ON TWEED, ENGLAND

The main line of the London and North Eastern Railway between London and Edinburgh crosses this stone arch bridge over the mouth of the river Tweed near the Anglo-Scottish border. It was designed by Robert Stephenson, son of George Stephenson, the "Father of Railways." It was opened by Queen Victoria and Prince Albert, August 29th, 1850. It has 28 arches; is 2,160 feet in length and 126 feet, six inches in height. It carries two tracks and cost approximately one million dollars to construct. The "Flying Scotsman" is shown crossing the bridge. » » » The Security Sectional Arch was the first practical firebox arch for locomotive service. While the fundamental design is unchanged, it has been continuously developed with the progress in locomotive design and is today an essential factor in the operation of modern steam motive power.

* * *

THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

Supply Trade

Wayne Z. Friend has joined the development and research staff of the **International Nickel Company, Inc.**, New York.

Angus G. Scott, formerly superintendent of power distribution, Cleveland Railways, has been appointed manager of line material activities, **Westinghouse Electric & Manufacturing Company,** with headquarters in East Pittsburgh, Pa.

W. A. Neill has been appointed manager of engineering and sales activities at the Holyoke, Mass., plant of the **Worthington Pump & Machinery Corporation,** Harrison, N. J. Mr. Neill was formerly manager of the corporation's Air Tool and Portable Compressor division, at Harrison.

The following elections and appointments have been made to the staff of the **Universal Atlas Cement Company,** Chicago: **George H. Reiter,** vice-president, and **W. L. Greenly,** assistant to vice-president; **A. C. Cronkrite,** vice-president, and **Paul F. Keatinge,** assistant to vice-president; **O. H. D. Rohwer,** vice-president, and **James D. Scovel,** assistant to vice-president, all of Chicago; **A. O. Stark,** vice-president, New York; **George S. Neel,** sales manager, Des Moines, Iowa; **L. B. Thomas,** district sales manager, St. Louis; **W. R. Heckendorn,** sales manager, New York; **W. A. McIntyre,** sales manager, Philadelphia; **Floyd L. Mabie,** manager, Atlas White bureau, New York.

OBITUARY

Frank H. Clark, vice-president and a director of the Pilliod Company, in charge of the Chicago office, died suddenly at the Commodore Hotel, New York City, on August 18. Mr. Clark was born at Ballston Spa, N. Y., in 1871, and had been associated with the railway supply business for about 43 years, having entered this field in 1894 with the Standard Coupler Company. In 1912, he organized the Chambers Valve Company, which was acquired by the Bradford Corporation in 1923, and in 1916 the Elvin Mechanical Stoker Company. Mr. Clark later became associated with the Pilliod Company, and since October, 1929, served as vice-president in charge of the Chicago office and a director until the time of his death.

Frank H. Clark

Max Breitung, president and founder of the Alfol Insulation Company, New York, died suddenly on August 19, of a heart attack, while playing tennis at the Gramatan Hotel Courts, Bronxville, N. Y.

Oliver W. Loomis, former vice-president of the National Malleable and Steel Castings Company, Cleveland, Ohio, and a director for the past 13 years, died while on vacation August 19, at Ludington, Mich., at the age of 65 years. Mr. Loomis joined the National Malleable in 1891, serving in various capacities until 1919, when he was appointed sales manager. He was first vice-president from 1933 until his retirement in 1936.

Construction

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—Bids will be received on August 30 by the Iowa State Highway Commission for the construction of an underpass carrying a relocated section of U. S. Highway No. 20 under the tracks of this company in Sac City, Iowa.

CHICAGO, ROCK ISLAND & PACIFIC.—A contract has been awarded to the Ross & White Company, Chicago, for furnishing and installing structural steel automatic electric locomotive coaling plants at Faribault, Minn., Manly, Iowa, Leslie, Mo., and Eldon. The new plants will have capacities of 100 tons and 50 tons.

ERIE.—The Board of New Jersey Public Utility Commissioners has ordered that work be started in March, 1938, to eliminate four grade crossings on this road in the Borough of Allendale, N. J.

NEW YORK, NEW HAVEN & HARTFORD.—This company has awarded a contract to the Ross & White Company, Chicago, for an automatic electric engine coaler for installation at Danbury, Conn.

WABASH.—A contract has been awarded to the Cooper-Little Company, Detroit, Mich., for alteration work on this company's brick roundhouse at Delray, Mich., consisting of the construction of three new stalls and the extension of two existing stalls. A contract has also been awarded to Longwill-Scott, Inc., St. Louis, Mo., for the installation at Delray of a new 105-ft. three-point bearing turntable and for the removal of the 80-ft. turntable at that point. The latter contract also involves the construction of the concrete pit for the new turntable.

Financial

ARIZONA EASTERN.—*Bonds.*—The company has applied to the Interstate Commerce Commission for a modification of the latter's order of January 11, 1926, so as to reduce from $13,077,000 to $12,793,000 the face amount of first and refunding mortgage bonds authorized to be issued by the applicant. Only the smaller amount has been issued, and the applicant desires to be relieved of reporting as to the status of the balance.

BALTIMORE & OHIO.—*Bonds.*—The Interstate Commerce Commission, Division 4, has authorized the Buffalo, Rochester & Pittsburgh to issue $5,183,000 of consolidated mortgage 4½ per cent bonds, to be sold at not less than 85.4 per cent of par to the Baltimore & Ohio, and the proceeds used to pay and retire, or to acquire and deposit with the trustee of the company's mortgage, $4,427,000 of general-mortgage 5 per cent bonds, due September 1.

BALTIMORE & OHIO.—*Reconstruction Finance Corporation Loan.*—The Interstate Commerce Commission, Division 4, has approved a loan of $5,000,000 to this company by the Reconstruction Finance Corporation. The proceeds of the loan will be used to meet maturing obligations of the Buffalo, Rochester & Pittsburgh which comprise that company's general mortgage bonds in the amount of $4,427,000, which mature September 1. The balance of the loan, $573,000, is to be applied in reimbursing the treasury in part for payment of equipment trust certificate maturities in July, 1937, of $500,000, and on August 1, 1937, of $450,000. The loan will be for five years and will mature on September 1, 1942. As collateral for the loan, the Baltimore & Ohio will deliver the following securities to the Reconstruction Finance Corporation: Buffalo, Rochester & Pittsburgh consolidated mortgage 4½ per cent bonds, due in 1957, $5,183,000; Southwestern Construction Company capital stock, 2,606 shares; an assignment of its equity in $4,600,000 of series C bonds and $1,679,000 of series E bonds issued under the applicant's refunding and general mortgage, now pledged as collateral security for $3,205,000 of the applicant's registered serial collateral notes.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Equipment Trust Certificates.*—The Interstate Commerce Commission, Division 4, has authorized the trustees to assume liability for $1,920,000 of 3¾ per cent equipment trust certificates, maturing in 15 equal annual installments of $128,000 on August 1, from 1938 to 1952. The issue has been sold to Salomon Brothers & Hutzler of New York at 102.444, making the average annual cost to the trustees approximately 3.39 per cent.

CHICAGO & EASTERN ILLINOIS.—*Reorganization.*—The Interstate Commerce Commission has announced that the reopened hearings on the reorganization plan

Continued on next left-hand page

17° LOSS IN SUPERHEAT

for each 1% of moisture carried over into the Superheater with the steam

The Elesco tangential steam dryer, installed on top of the dry pipe elbow in the dome, is very efficient in preventing moisture from entering the superheater.

Its separating efficiency is very high under normal operating conditions and only slightly lower with steam carrying over as much as 20% moisture.

◆ ◆ ◆ ◆ ◆ ◆

Steam inlet located at highest point in the dome.

● ●

An unobstructed, non-cloggable steam inlet.

● ●

Has no moving parts.

THE SUPERHEATER COMPANY

Representative of AMERICAN THROTTLE COMPANY INC.
60 East 42nd Street, NEW YORK
Peoples Gas Building, CHICAGO
Canada: THE SUPERHEATER COMPANY, LTD.
MONTREAL

A-1172

Superheaters « Feed Water Heaters « Exhaust Steam Injectors « Superheated Steam Pyrometers « American Throttles « Tangential Steam Dryers

of this company will be held before Commissioner Porter on October 6. The original date had been set for September 9.

DENVER & RIO GRANDE WESTERN.—*Acquisition.*—The Interstate Commerce Commission, Division 4, has authorized the trustees to acquire a line of narrow gage railroad of the Colorado & Southern extending from Gunnison, Colo., to Baldwin, 17.62 miles.

GREYHOUND CORPORATION. — *Stock.* — This company has applied to the Interstate Commerce Commission for authority to issue 133,228 shares of common stock to be exchanged for minority stock of the Atlantic Greyhound Corporation. The total value of the stock to be issued is stated at $2,098,341 and it is proposed to exchange 9⅛ shares of it for each share of Atlantic. The application states that the parent corporation's relations with Atlantic's minority holders "have been most cordial" but adds that the transaction will bring about a better integration of operations.

HOBART SOUTHERN. — *Abandonment.* — This company has applied to the Interstate Commerce Commission for authority to abandon its line extending from Hobart Mills, Calif., to Truckee, 6.41 miles.

KANSAS CITY SOUTHERN.—*Bonds.*—The Interstate Commerce Commission, Division 4, has authorized the Kansas City, Shreveport & Gulf Terminal to extend from August 1, to August 1, 1950, the maturity date of $150,000 of first mortgage bonds. The bonds are owned by the Kansas City Southern, and it has agreed to the extension.

LOUISIANA SOUTHERN. — *Bonds.* — The Interstate Commerce Commission, Division 4, has authorized this company to reduce the principal amount of first-mortgage refunding gold bonds from $1,000,000 to not exceeding $200,000, and to reduce the rate of interest on the bonds from 6 to 4 per cent.

NEW YORK, NEW HAVEN & HARTFORD. —*Abandonment.* — The Interstate Commerce Commission, Division 4, has authorized the trustees to abandon a line extending from East Thompson, Conn., to Webster, Mass., 5.47 miles.

NEW YORK, NEW HAVEN & HARTFORD. —*Abandonment.* — The Interstate Commerce Commission, Division 4, has authorized the trustees to abandon a line extending from Allerton Farms, Conn., to Southbury, 11.6 miles.

NEW YORK, NEW HAVEN & HARTFORD. —*Abandonment.* — The Interstate Commerce Commission, Division 4, has authorized the trustees of this company to abandon the operation and the trustees of the Old Colony to abandon the line extending from Sterling Junction, Mass., to Sterling, 2.09 miles.

NORFOLK SOUTHERN.—*Reorganization.*—Committees of bondholders of this company have agreed on a plan of reorganization whereby holders of first mortgage 5 per cent bonds would receive the principal and half of their interest in new first mortgage 4½ per cent bonds and balance of interest in income bonds. General mortgage bondholders would receive 40 per cent in new first mortgage bonds and the balance in income bonds, interest arrearages to be paid in new common stock. Raleigh & Cape Fear first mortgage bonds would be paid off in new first mortgage bonds, interest arrears in common stock. Aberdeen & Asheboro first mortgage bondholders would receive half in new mortgage bonds and half in income bonds, interest arrears in income bonds. Raleigh and Southport bonds would be paid off 10 per cent in new first mortgage bonds, 50 per cent in income bonds and balance in common stock, interest arrears in common stock, and the same terms would apply to Norfolk Southern first and refunding bonds. Suffolk & Carolina bonds would receive salvage from the line to be abandoned plus a small percentage in new bonds representing the portion of the line retained in service. Common stockholders would receive the right to buy new common stock at stated prices beginning at $10 on the basis of one new share for each hundred of the old.

SEABOARD AIR LINE.—*Advance to Tampa Northern.*—Receivers of this road have applied to the Interstate Commerce Commission for authority to advance to the Tampa Northern sufficient funds for payment of interest at 3 per cent on the latter's $1,258,000 issue of first mortgage 5 per cent bonds which matured on July 1, 1936. No interest has been paid since the maturity date, and the proposed advance is part of a plan for extending the bonds.

SOUTHERN PACIFIC.—*Bonds of San Antonio & Arkansas Pass.*—The Texas & New Orleans has applied to the Interstate Commerce Commission for a modification of the latter's order of November 3, 1932, so as to reduce from $4,056,000 to $2,700,000 the amount of first mortgage 4 per cent bonds authorized to be issued by the S. A. & A. P.

WICHITA FALLS & SOUTHERN.—*Reconstruction Loan.* — The Interstate Commerce Commission, Division 4, has approved the extension of time of payment for a period of three months of a loan of $300,000 to this company by the Reconstruction Finance Corporation, maturing on August 18.

YOSEMITE VALLEY. — *Reorganization.* — The Interstate Commerce Commission, Division 4, has ordered that Howard C. Bonsall, trustee of this company, be paid the sum of $450 a month from January 29, 1937, to May 29, 1937.

Dividends Declared

Delaware & Boundbrook. — $2.00, quarterly, payable August 20 to holders of record August 16.
Virginian. — $2.00, payable September 25 to holders of record September 11.

Average Prices of Stocks and Bonds

	Aug. 24	Last week	Last year
Average price of 20 representative railway stocks..	50.21	51.33	53.28
Average price of 20 representative railway bonds..	78.51	79.60	81.20

Railway Officers

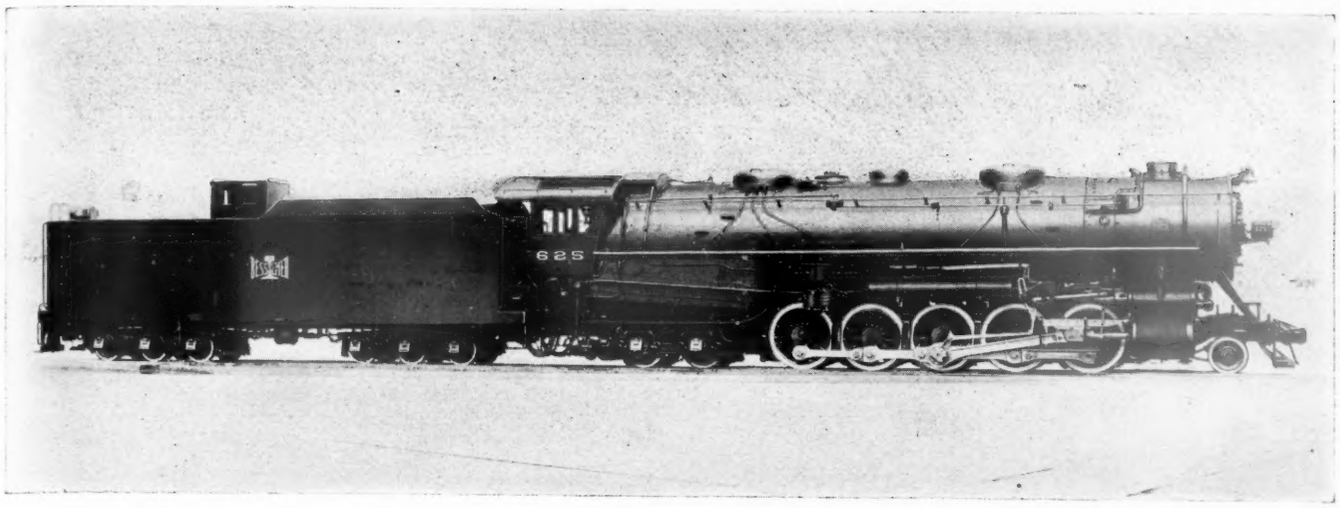
EXECUTIVE

William K. Tate, assistant to the vice-president and traffic manager of the Nashville, Chattanooga & St. Louis, who has been appointed to the newly-created position of assistant to the president, with headquarters at Nashville, Tenn., as reported in the *Railway Age* of August 21, was born on January 13, 1898, at Tyler, Tex., and was educated at Vanderbilt university, Nashville. He entered railway service on March 13, 1917, with the N. C. & St. L., as a draftsman in the engineering department, later serving as instrumentman and topographer on a survey party. On January 1, 1918, he was advanced to assistant division engineer on the Huntsville division, with headquarters at Tullahoma, Tenn., holding this position until October 1, 1918, when he volunteered for service in the United States Army, serving at the Officers Training Camp at Fort Monroe, Va. On December 1, 1918, he returned to his former position with the N. C. & St. L. at Tullahoma, serving there until March 16, 1929, when he was appointed industrial engineer in the industrial and public relations division of the traffic department, with headquarters at Nashville. On January 1, 1935, he was placed in charge of the industrial and public relations division, with the same title, serving in this capaicty until the spring of 1936, when he was appointed assistant to the vice-president and traffic manager.

William K. Tate

Albert W. Hayes, assistant to vice-president in charge of traffic of the Railway Express Agency, has been appointed executive assistant to the president, with headquarters as before at New York, effective August 15, as noted in the *Railway Age* of August 21. Mr. Hayes has had 38 years of continuous service in the express business, beginning as a driver at Monett, Mo. He was promoted to messenger within six months and a year later became cashier at Memphis, Tenn., then

Continued on next left-hand page



BUILT FOR BESSEMER & LAKE ERIE

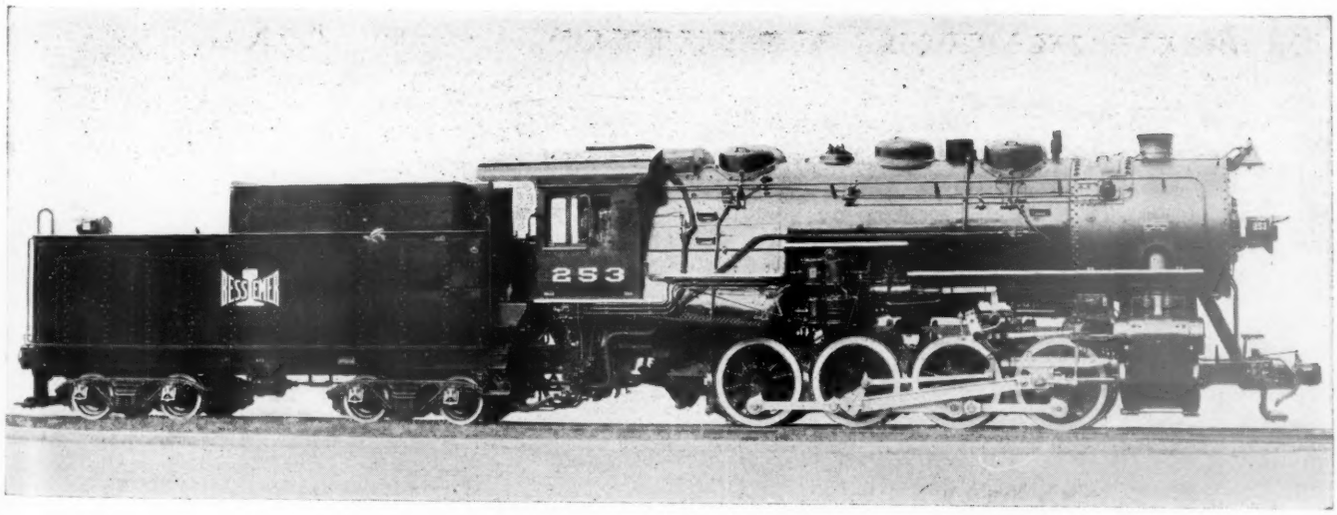
2-10-4 Type

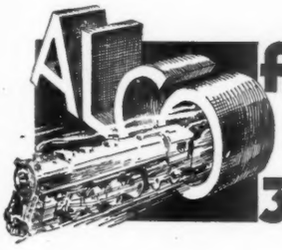
Weight on Drivers	369,100 pounds
Weight of Engine	520,000 pounds
Cylinders	31 x 32 inches
Diameter of Drivers	64 inches
Boiler Pressure	250 pounds
Maximum Tractive Power (with Booster)	110,400 pounds

0-8-0 Type

Weight on Drivers	279,000 pounds
Weight of Engine	279,000 pounds
Cylinders	25 x 30 inches
Diameter of Drivers	57 inches
Boiler Pressure	230 pounds
Maximum Tractive Power	64,300 pounds

NEW POWER — NEW PROFITS





AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET · NEW YORK · N·Y

becoming chief clerk at the Union depot in St. Louis, Mo. His next seven years were spent as agent, first at El Reno, and afterwards at Tulsa, Okla. Returning to St. Louis in February, 1911, Mr. Hayes was appointed chief clerk to general superintendent, then becoming assistant to general manager at Chicago. In July, 1914, he took over the duties of assistant to vice-president and general manager. From July, 1916, to July, 1918, Mr. Hayes had charge of the Wells Fargo vehicle service in Chicago, and from the time of consolidation until January, 1927, was superintendent of organization on the vice-president's staff, covering the Central departments. Mr. Hayes was then appointed superintendent of the Nebraska, Wyoming and Iowa division, with headquarters at Omaha, Neb., leaving the operating supervision in May, 1935, to become assistant to vice-president in charge of traffic at the executive headquarters in New York City, the position he held at the time of his recent advancement.

Albert W. Hayes

Karl A. Paine, superintendent of transportation of the Railway Express Agency at Chicago, has been appointed assistant to vice-president in charge of traffic at New York, effective August 15, as noted in the *Railway Age* of August 21. Mr. Paine, who was identified with transportation affairs in Chicago for 19 years, has been in the express business for about 37 years. He began his career as a porter at Burrton, Kan., and later served as clerk, cashier, messenger and agent at express offices in Kansas, Oklahoma and Texas. In August, 1911, he was assigned to the superintendent's office at St. Joseph, Mo., as chief clerk, and within five months was appointed route agent at Amarillo, Tex., continuing in that capacity for two and one-half years. He then served as chief clerk to several officials and for over four years he was in the superintendent's office at Oklahoma City, Okla. In November, 1918, he began his association with express transportation affairs as chief clerk of the department. In May, 1923, he was appointed to a similar capacity with the department's traffic bureau. In July, 1929, he became superintendent of transportation, with jurisdiction over eastern lines.

Karl A. Paine

Wilber G. Hunt, whose appointment to the newly-created position of assistant general auditor of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., was reported in the *Railway Age* of August 7, has been in railroad service for about 27 years. He was born on September 4, 1891, in Iowa and after a public school education entered railway service in August, 1910, with the Chicago & North Western, serving as a call boy, hostler helper and hostler. In the following year Mr. Hunt entered the service of the Chicago, Milwaukee, St. Paul & Pacific as a clerk in the superintendent's office, holding this position until 1913, when he went with the Santa Fe as a clerk in the auditor's office at Los Angeles, Cal. Later Mr. Hunt served as traveling accountant at the same point, and in January, 1919, he was appointed chief clerk to the auditor of the Panhandle & Santa Fe at Amarillo, Tex. In August of the same year he was sent to Topeka as chief clerk to the auditor of disbursements of the Santa Fe, holding this position until December, 1920, when he was advanced to assistant auditor of disbursements, with the same headquarters. In January, 1923, he returned to Los Angeles as assistant auditor of the Coast Lines and in October, 1926, was appointed auditor, with the same headquarters. His appointment as assistant general auditor at Topeka became effective on August 1.

Wilber G. Hunt

OPERATING

Walter Reese, executive assistant to the president of the Railway Express Agency, with headquarters at New York, whose appointment as general manager of the Eastern Lakes department with headquarters at Cleveland, Ohio, was reported in the *Railway Age* of August 21, has been in express service for more than 36 years. He began his career in June, 1901, as express clerk and telegraph operator at Owensboro, Ky. After three years in these capacities he became an expressman, his first position being in the general agent's office of the American Express Company at Memphis, Tenn. During the following thirteen years he served successively as route agent, chief clerk to superintendent, and secretary and assistant to the manager at St. Louis. In June, 1918, he was further promoted to assistant to the vice-president, which position he continued to hold through the various reorganizations of the company from which the Railway Express Agency was developed in 1929. In April, 1934, he was appointed general manager, with headquarters at St. Paul, Minn., and on August 1, 1936, he was sent to New York as executive assistant, the position he was holding at the time of his recent appointment.

Walter Reese

TRAFFIC

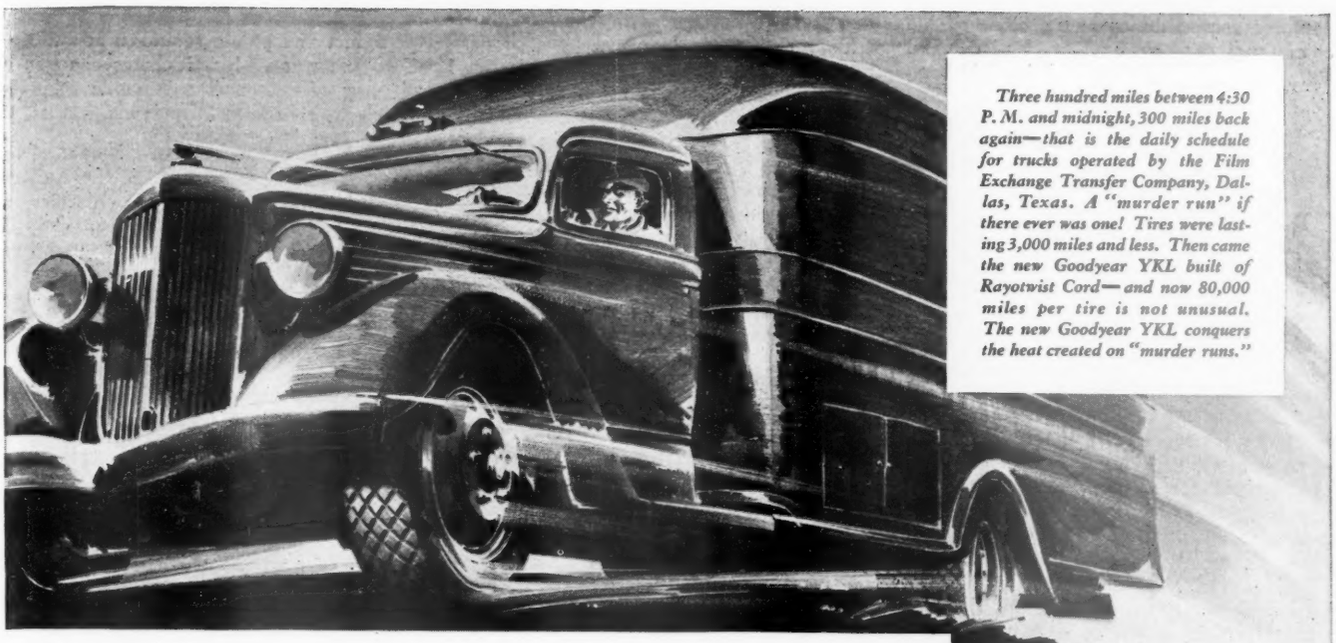
L. H. Landis, manager of the industrial development department of the Minneapolis & St. Louis, who was granted a furlough, effective May 1, resumed his duties on August 15.

Martin E. Klein, chief clerk to the freight traffic manager of the Pennsylvania at Chicago, has been promoted to coal freight agent, with the same headquarters, to succeed **Joseph E. Griffin,** deceased. Mr. Klein's appointment will become effective on September 1.

ENGINEERING AND SIGNALING

R. W. Sheffer, division engineer of the Middle division of the Pennsylvania, with headquarters at Altoona, Pa., has been transferred in the same capacity to the Pittsburgh division at Pittsburgh, Pa., succeeding **H. H. Pevler,** who has been

Continued on next left-hand page



Three hundred miles between 4:30 P. M. and midnight, 300 miles back again—that is the daily schedule for trucks operated by the Film Exchange Transfer Company, Dallas, Texas. A "murder run" if there ever was one! Tires were lasting 3,000 miles and less. Then came the new Goodyear YKL built of Rayotwist Cord—and now 80,000 miles per tire is not unusual. The new Goodyear YKL conquers the heat created on "murder runs."

BUT WHY TALK "MURDER RUNS" TO ME?...

I HAUL FREIGHT IN FLINT

That's a fair enough question.

The chances are 99 to 1 that you never do give your tires the beating they'd get on a "murder run."

Even so—news of this great new super tire, the Goodyear YKL, *is* important to you. Goodyear engineers spent seven years developing the new YKL to meet an urgent need for such a tire.

And these same engineers have developed another tire just as scientifically fitted to your requirements as the YKL is suited to the "murder runs."

It is the Goodyear All-Weather Balloon, a tire which—for service less severe than the "murder runs"—will give you more miles of trouble-free service per dollar than any other tire produced.

It has the famous *All-Weather Tread* for greater traction, less skidding—*Supertwist Cord,* blowout protection in every ply—*Extra-Strong Bead Construction* for heavy, swaying loads—*High Profile Tread Shape* for better traction, cooler running—*Heat-Resisting Rubber* for long, even wear, greater strength.

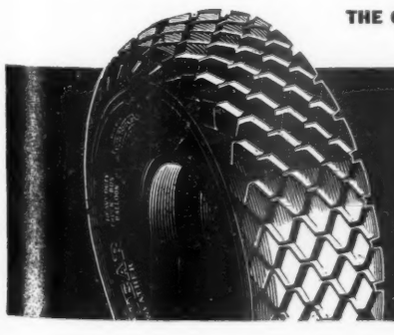
So whether it's the YKL or the All-Weather Balloon—

Put Goodyears—the right Goodyears—on ANY job and watch your mileage jump!

CAUTION!

The new YKL Tire is recommended only for the most destructive types of service—for the "murder runs" over long distances at sustained high speeds. In ordinary trucking, its extraordinary capacities cannot be fully utilized—and, frankly, its higher price cannot be justified.

THE GOODYEAR TIRE & RUBBER COMPANY, INC., AKRON, OHIO



There's a GOODYEAR BATTERY now!

GOODYEAR TRUCK TIRES

assigned special duties in the office of the chief engineer, system, at Philadelphia, Pa. Mr. Sheffer is succeeded at Altoona by **W. R. Parvin,** as noted in the *Railway Age* of August 21.

MECHANICAL

R. L. Black, master mechanic of the Radford and Shenandoah divisions of the Norfolk & Western, with headquarters at Shaffers Crossing, Roanoke, Va., has been appointed superintendent of shops at Roanoke, succeeding **Henry F. Greenwood,** who retired on August 1. **F. D. Veazey,** assistant master mechanic of the Radford and Shenandoah divisions, has been promoted to master mechanic on these divisions, succeeding Mr. Black. **H. C. Wyatt,** general foreman at Columbus, Ohio, has been appointed assistant master mechanic, Radford and Shenandoah divisions, succeeding Mr. Veazey. **John S. Mastin,** road foreman of engines, Pocahontas division, at Bluefield, W. Va., retired from active service on August 1.

OBITUARY

Charles W. Pfaff, general agent of the Philadelphia district of the Lehigh Valley, died on August 24 after a year's illness. He was 58 years old.

Hunter McDonald, who retired on November 1, 1931, as chief engineer of the Nashville, Chattanooga & St. Louis, died on August 24, at Nashville, Tennessee, following an illness of several weeks.

Thomas J. F. King, assistant district engineer of the Canadian National, with headquarters at Quebec, Que., died on August 17, after several months illness, at the age of 56 years.

William Alter, former general foreman of the passenger car department of the Central of New Jersey at Elizabethport, N. J., died on August 25 at the Alexian Brothers Hospital, after a brief illness, at the age of 73 years. Mr. Alter retired on July 1, 1935, after 40 years of service with this road.

Bernard A. Wood, who retired about a month ago as chief engineer of the Mobile & Ohio, with headquarters at St. Louis, Mo., died in a hospital at that point on August 18 of heart disease. Mr. Wood had been connected with the Mobile & Ohio for 40 years. He was born on February 14, 1867, at Tuscalcosa, Ala., and received his higher education at the University of Alabama. He first entered railway service in July, 1888, as a resident engineer on the Louisville & Nashville. In the following year he was appointed assistant engineer, which position he held until 1891, when he resigned to become assistant engineer on a survey of the international boundary between the United States and Mexico. During 1895 he served on the Nicaragua Canal Board and in the following year he engaged in mining engineering work in Colorado. In 1897 Mr. Wood entered the employ of the Mobile & Ohio as an assistant engineer, later serving as resident engineer. He had been chief engineer of this road since January, 1910.

Halle S. Ray, director of personnel and public relations of the Chicago, Rock Island & Pacific, died on August 22 at his home at Chicago at the age of 68 years. A native of Griswold, Conn., Mr. Ray entered railway service in 1890 with the Rock Island in the office of the passenger agent at Philadelphia, Pa., where he later became city passenger agent. For a short time during 1893, he served with the Denver & Rio Grande as traveling passenger agent at New York, then returning to the Rock Island as city passenger agent at Philadelphia. During the following ten years Mr. Ray occupied various positions in the passenger department of this road, then being appointed general eastern passenger agent at New York of the Rock Island, the St. Louis-San Francisco, the Chicago & Eastern Illinois and the St. Louis, Kansas City & Colorado, these roads at that time being under common control. In 1905 he was appointed assistant general passenger agent of the Rock Island and affiliated lines, with headquarters at St. Louis, being transferred to Chicago in 1908 and then to Des Moines, Iowa, in 1912. During the World War, Mr. Ray served successively as a captain in the U. S. Army, in the office of the Quartermaster General at Washington, as assistant chief of the Federal Inland Traffic Service and as major and lieutenant-colonel in the army, being discharged with the latter title in 1919, after service in France. He returned to railroad service as assistant general passenger agent of the Rock Island at Des Moines, and in 1921 he was appointed assistant to the president, personnel and public relations, at Chicago. Two years later his title was changed to director of personnel and public relations, which position he held until his death.

W. K. Weaver, general manager of the Eastern Lakes department of the Railway Express Agency, with headquarters at Cleveland, Ohio, died suddenly on July 28 at Rochester, Minn., following an operation. Mr. Weaver first entered the express business in September, 1901, as a messenger for the Southern Express Company. Subsequently he held such positions as agent's chief clerk, chief clerk to superintendent and assistant agent and was finally assigned to the work of organizing claim bureaus. Later he served as

W. K. Weaver

traveling auditor and inspector of agencies, route agent, and commercial agent. When the Adams Express Company acquired the Southern Express Company, Mr. Weaver was designated to represent both companies in New York City as general traffic agent, and when the business of all express companies was consolidated in July, 1918, he was appointed superintendent at Richmcnd, Va. After 15 years in this capacity Mr. Weaver was appointed to the vice-president's staff in Atlanta, Ga., and in April, 1934, became superintendent of organization, reporting to the president at New York. In June, 1935, he became executive assistant at New York and in August, 1936, he was sent to Cleveland as general manager of the Eastern Lakes department, which position he held until his death.

* * * *

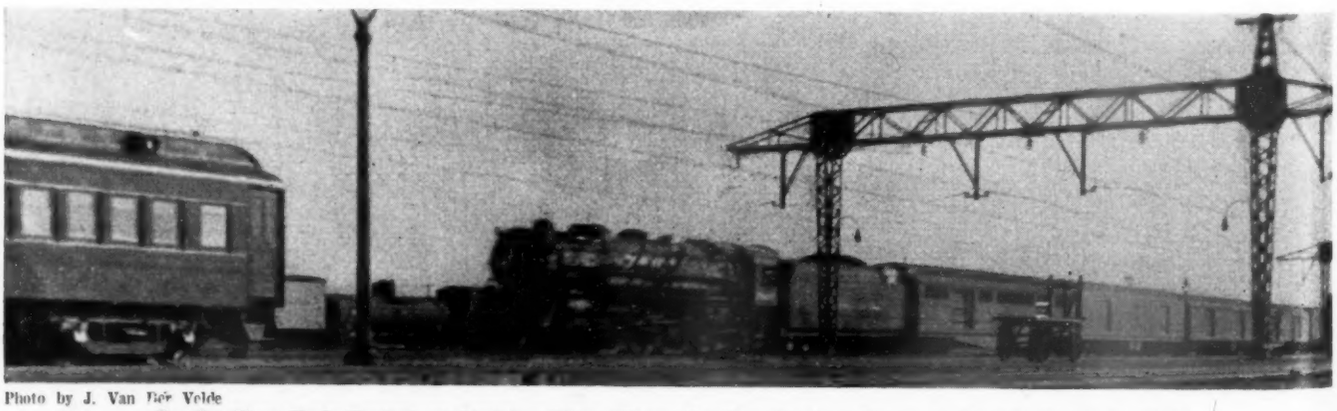
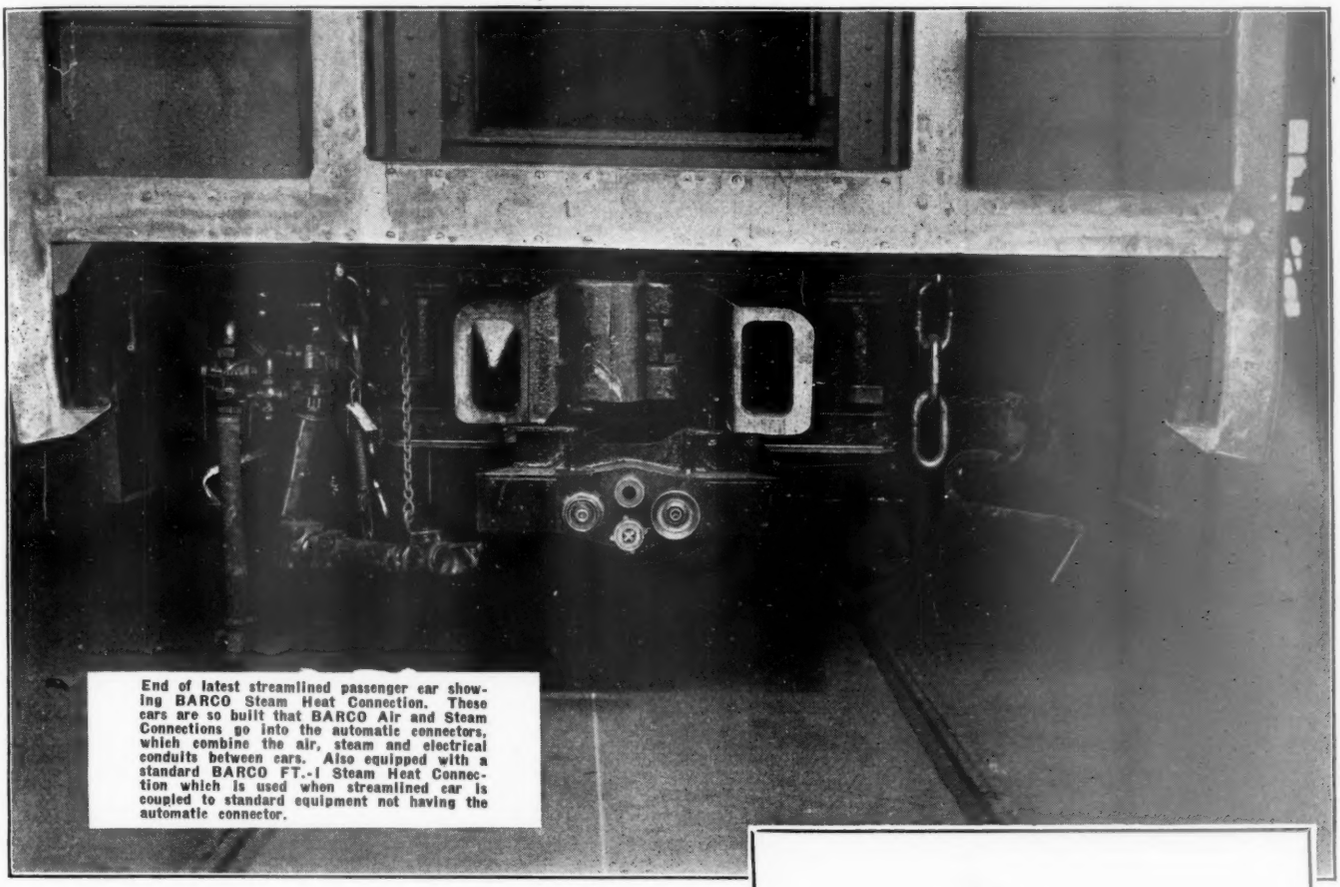


Photo by J. Van Der Velde

On the New York Central at Lindale, Ohio, Where the Transfer from Steam to Electric Power Is Made

Table of Freight Operating Statistics appears on next left-hand page

HIGH SPEED, STREAMLINED TRAINS BARCO-EQUIPPED



End of latest streamlined passenger car showing BARCO Steam Heat Connection. These cars are so built that BARCO Air and Steam Connections go into the automatic connectors, which combine the air, steam and electrical conduits between cars. Also equipped with a standard BARCO FT.-1 Steam Heat Connection which is used when streamlined car is coupled to standard equipment not having the automatic connector.

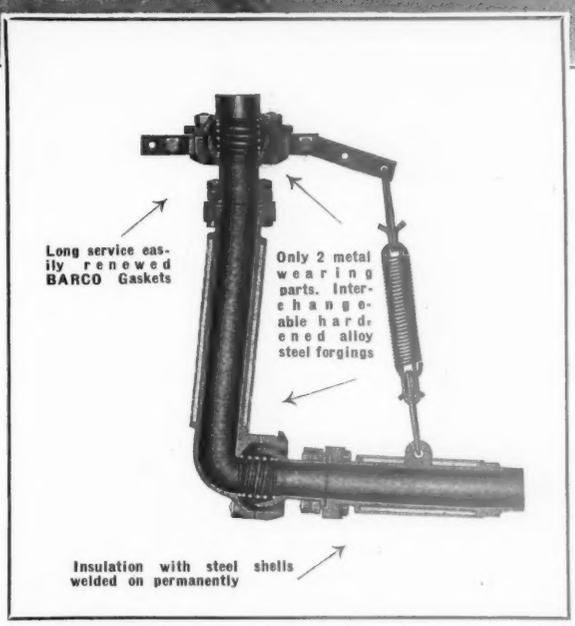
Don't get the idea that all car steam heat connections are alike. They are not.

BARCO connections will furnish more steam at the same initial pressure; heat cars better or heat more cars—Barco connections will heat cars with less reduction in pressure per car.

BARCO first cost is competitive but the maintenance cost is much lower. BARCO has only two gaskets to replace and these usually last a season, or more.

It is not only the cost of the gasket which counts. The cost of labor in frequent replacing of gaskets is a big item. It usually occurs during stormy weather when your car men are over-loaded with work and working under bad conditions.

Check your repair records—study your conditions and SPECIFY BARCO FT-1 CAR STEAM HEAT CONNECTIONS on all future orders.


Long service easily renewed BARCO Gaskets
Only 2 metal wearing parts. Interchangeable hardened alloy steel forgings
Insulation with steel shells welded on permanently

BARCO MANUFACTURING COMPANY
1807 W. Winnemac Ave., Chicago, Ill.
THE HOLDEN CO., LTD.
In Canada
Montreal - Moncton - Toronto - Winnipeg - Vancouver

BARCO

years making quality products for railroads

Freight Operating Statistics of Large Steam Railways—Selected Items for the Month of June,

Region, road, and year	Miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (*thousands*)	Car-miles: Per cent loaded	Ton-miles (*thousands*): Gross, excluding locomotives and tenders	Ton-miles (*thousands*): Net, revenue and non-revenue	Number of road locomotives on line: Serviceable: Not stored	Serviceable: Stored	Unserviceable	Per cent unserviceable
New England Region:												
Boston & Albany 1937	374	135,378	140,613	9,404	3,068	67.6	169,414	59,454	55	19	17	18.7
1936	373	122,486	127,248	8,734	3,045	67.3	159,849	53,624	49	10	33	35.9
Boston & Maine 1937	1,941	271,130	301,059	23,610	9,463	71.1	505,309	189,254	121	6	131	50.8
1936	1,963	261,934	292,716	28,206	8,991	69.2	487,075	180,060	118	6	162	56.6
N. Y., New H. & Hartf. 1937	2,011	347,079	428,556	25,406	12,124	69.1	635,749	233,809	187	2	80	30.3
1936	2,011	339,649	408,059	19,786	11,277	66.2	609,338	219,705	180	7	105	34.7
Great Lakes Region:												
Delaware & Hudson 1937	830	221,919	292,509	32,498	7,645	65.8	467,499	220,568	96	128	35	13.5
1936	831	205,703	270,332	28,801	6,893	65.5	419,084	194,442	90	147	41	14.7
Del., Lack. & Western 1937	983	369,685	409,047	55,290	12,360	68.2	717,119	284,265	134	17	76	33.5
1936	983	361,526	398,945	53,386	11,513	65.5	684,148	263,885	146	1	93	38.8
Erie (incl. Chi. & Erie) 1937	2,277	681,833	725,338	42,110	28,955	66.3	1,745,147	665,686	233	39	194	41.6
1936	2,298	662,658	704,746	37,063	28,500	65.2	1,721,495	635,005	209	49	216	45.6
Grand Trunk Western 1937	1,027	264,076	265,099	2,395	7,235	64.9	424,380	149,340	85	..	49	36.6
1936	1,027	263,031	264,515	3,042	6,887	62.8	414,444	142,861	85	..	55	39.3
Lehigh Valley 1937	1,303	352,330	386,243	47,548	13,052	66.3	817,224	351,053	131	11	130	47.8
1936	1,312	382,370	404,804	45,744	12,585	66.0	774,215	319,628	123	1	160	56.3
New York Central 1937	10,723	2,756,780	2,894,725	174,883	90,786	60.0	5,973,322	2,376,760	956	144	360	24.7
1936	10,789	2,521,844	2,648,924	162,128	84,055	59.7	5,403,062	2,147,840	839	145	534	35.2
New York, Chi. & St. L. 1937	1,672	486,391	490,420	5,908	17,045	65.7	1,003,491	373,915	163	14	18	9.2
1936	1,672	456,851	461,541	6,809	15,959	64.0	945,586	341,700	138	23	32	16.6
Pere Marquette 1937	2,081	351,984	359,576	5,230	9,047	61.2	572,266	208,576	114	9	28	18.9
1936	2,081	356,363	366,885	5,403	9,091	60.8	580,126	212,454	119	3	31	20.3
Pitts. & Lake Erie 1937	234	93,574	96,349	....	3,563	64.6	298,465	173,292	36	13	26	34.7
1936	234	74,165	76,604	14	2,948	63.3	246,606	141,703	27	13	29	42.0
Wabash 1937	2,421	554,790	562,752	11,321	16,773	66.1	956,602	327,932	148	31	114	38.9
1936	2,435	571,466	580,452	11,792	17,441	64.2	1,020,069	342,490	129	37	143	46.3
Central Eastern Region:												
Baltimore & Ohio 1937	6,351	1,556,988	1,890,015	190,751	47,750	62.6	3,271,962	1,479,130	745	57	484	37.6
1936	6,366	1,470,608	1,790,241	174,445	44,693	62.4	3,040,911	1,356,650	651	29	610	47.3
Central of New Jersey 1937	681	157,102	174,376	34,339	4,902	61.8	329,450	153,289	82	3	67	44.1
1936	681	140,448	157,614	29,059	4,498	61.2	301,607	137,995	57	14	76	51.7
Chicago & Eastern Ill. 1937	931	177,692	177,818	2,876	4,430	66.7	264,685	105,805	55	1	46	45.1
1936	931	164,939	165,715	2,596	4,051	68.0	238,999	99,229	52	3	53	49.1
Elgin, Joliet & Eastern 1937	435	112,612	114,059	1,926	2,812	60.7	218,069	109,734	57	3	22	26.8
1936	434	91,168	91,828	1,383	2,350	63.4	175,317	88,482	56	..	30	34.9
Long Island 1937	393	28,293	29,011	15,287	245	50.6	19,054	7,289	29	9	12	24.0
1936	392	27,231	27,760	15,738	270	51.2	20,835	8,121	28	5	17	34.0
Pennsylvania System 1937	10,027	3,259,540	3,744,627	421,340	115,031	62.7	7,830,329	3,522,876	1,494	262	547	23.8
1936	10,034	2,932,874	3,321,532	353,210	101,565	62.3	6,840,339	2,987,744	1,383	162	849	35.5
Reading 1937	1,445	441,200	486,949	57,260	12,147	62.2	869,759	418,499	206	29	104	30.7
1936	1,449	386,030	419,484	49,208	10,564	60.7	759,757	352,020	187	60	96	28.0
Pocahontas Region:												
Chesapeake & Ohio 1937	3,050	821,921	862,973	34,169	36,848	57.2	3,000,013	1,606,914	356	81	111	20.3
1936	3,050	826,198	867,217	35,625	38,202	55.4	3,226,384	1,732,695	393	62	75	14.2
Norfolk & Western 1937	2,180	669,825	709,977	35,757	28,322	59.4	2,259,780	1,179,183	271	58	39	10.6
1936	2,145	618,086	651,753	32,354	25,196	59.1	2,089,545	1,090,505	266	64	40	10.8
Southern Region:												
Atlantic Coast Line 1937	5,117	601,254	604,967	8,026	13,084	63.7	715,741	259,495	231	46	95	25.5
1936	5,100	580,110	582,214	7,408	11,559	65.1	616,564	219,557	218	67	110	27.8
Central of Georgia 1937	1,886	262,433	264,575	3,756	5,610	71.4	303,864	117,999	112	..	17	13.2
1936	1,886	245,647	247,687	3,577	5,208	70.7	284,283	104,839	105	..	22	17.3
Illinois Central (incl. 1937	6,547	1,534,858	1,554,155	29,684	37,495	64.0	2,299,040	905,514	660	25	174	20.3
Y. & M. V.) 1936	6,562	1,551,605	1,568,482	28,689	36,952	62.7	2,295,860	892,984	624	14	223	25.9
Louisville & Nashville 1937	4,931	1,159,479	1,252,500	30,034	26,916	60.0	1,880,873	881,572	367	45	151	26.8
1936	4,998	1,036,638	1,133,798	29,060	24,871	60.3	1,727,907	816,549	337	24	204	36.1
Seaboard Air Line 1937	4,295	489,143	505,042	3,004	11,992	67.4	675,144	259,951	236	10	63	20.4
1936	4,295	426,542	442,264	3,946	10,354	66.3	578,986	209,126	220	7	98	30.2
Southern 1937	6,596	1,266,106	1,284,698	18,821	27,933	68.0	1,568,085	633,520	478	8	281	36.6
1936	6,596	1,209,806	1,227,999	19,165	27,449	68.5	1,477,280	565,112	470	35	289	36.4
Northwestern Region:												
Chi. & North Western 1937	8,397	907,613	940,155	19,677	24,526	64.8	1,494,233	575,875	330	135	190	29.0
1936	8,355	1,003,947	1,045,556	26,506	26,719	63.6	1,651,799	601,178	353	111	223	32.5
Chicago Great Western 1937	1,450	251,705	251,814	4,457	7,127	62.9	427,089	152,828	70	2	22	23.4
1936	1,458	222,802	223,710	7,499	6,967	64.9	412,037	152,604	60	..	27	31.0
Chi., Milw., St. P. & Pac. 1937	11,105	1,278,831	1,373,194	57,815	35,138	62.6	2,216,255	884,102	459	104	107	16.0
1936	11,121	1,315,784	1,402,075	60,655	35,944	62.3	2,266,361	894,194	458	87	139	20.3
Chi., St. P., Minneap. & Om. 1937	1,636	213,567	219,909	9,426	4,847	66.4	295,334	119,652	103	22	22	15.0
1936	1,637	212,139	221,115	9,921	4,952	67.9	298,546	119,735	86	38	20	13.9
Great Northern 1937	7,997	805,191	802,950	30,051	28,907	59.9	2,083,668	995,518	344	34	175	31.6
1936	8,080	745,752	743,883	25,427	25,580	60.5	1,780,340	819,390	363	49	184	30.9
Minneap., St. P. & S. St. M. 1937	4,278	377,158	386,124	4,571	8,776	68.7	511,529	217,069	123	..	29	19.1
1936	4,273	365,856	372,865	3,590	8,704	68.7	506,469	217,564	118	..	37	23.9
Northern Pacific 1937	6,429	681,402	722,421	39,036	21,427	66.7	1,306,461	539,845	402	5	67	14.1
1936	6,429	693,371	755,173	51,811	20,295	66.0	1,246,636	511,863	339	16	87	19.7
Central Western Region:												
Alton 1937	912	212,966	228,447	1,582	4,712	60.5	297,964	122,332	75	..	23	23.5
1936	928	197,583	209,271	1,244	4,567	60.7	294,887	107,015	66	3	29	29.6
Atch., Top. & S. Fe (incl. 1937	13,562	2,154,270	2,347,865	114,193	60,739	58.6	4,038,389	1,285,827	655	11	282	29.7
G.C. & S.F. & P. & S.F.) 1936	13,228	1,812,713	1,968,500	104,241	52,695	63.1	3,285,695	1,080,809	554	93	329	33.7
Chicago, Burl. & Quincy 1937	8,934	1,135,737	1,174,323	41,695	31,662	65.9	1,827,199	766,790	443	11	84	15.6
1936	8,937	1,182,120	1,230,706	44,219	31,442	63.2	1,864,685	765,795	423	3	111	20.7
Chi., Rock I. & Pac. (incl. 1937	8,113	1,269,931	1,290,433	9,137	29,324	61.2	1,840,769	681,892	428	7	187	30.1
Chi., Rock I. & Gulf) 1936	8,176	1,206,660	1,229,062	5,831	27,175	61.5	1,672,526	594,055	383	13	312	44.1
Denver & R. G. Wn. 1937	2,576	290,288	317,991	33,793	7,419	71.2	457,125	206,082	160	9	33	16.3
1936	2,584	250,670	274,142	26,726	6,662	68.3	405,344	170,456	156	15	30	14.9
Southern Pacific—Pacific 1937	8,607	1,677,680	1,846,575	234,261	53,955	61.5	3,433,109	1,117,626	592	58	150	18.8
Lines 1936	8,614	1,493,326	1,623,284	184,076	48,567	61.5	3,083,264	971,472	518	66	198	25.3
Union Pacific 1937	9,911	1,617,486	1,679,791	97,670	52,556	67.8	3,117,999	1,159,794	588	88	197	22.6
1936	9,828	1,473,672	1,526,009	85,539	48,763	67.9	2,889,403	1,051,071	578	73	220	25.3
Southwestern Region:												
Mo.-Kans.-Texas Lines 1937	3,282	442,743	450,099	6,211	11,934	62.0	736,904	268,744	126	2	72	36.0
1936	3,282	386,366	392,291	6,222	10,668	59.6	660,510	221,450	101	22	80	39.4
Missouri Pacific 1937	7,143	1,131,988	1,168,060	25,013	31,730	63.4	1,947,633	745,250	364	93	82	15.2
1936	7,201	1,127,334	1,167,442	24,656	31,395	62.3	1,972,476	742,700	334	73	135	24.9
St. Louis-San Francisco 1937	4,888	820,799	833,995	11,485	16,771	60.1	1,077,268	423,726	283	40	82	20.2
1936	4,888	718,893	725,455	10,318	15,170	63.9	922,129	363,109	282	87	55	13.0
St. Louis Southwestern 1937	1,733	373,377	375,647	4,985	8,738	55.6	560,585	166,426	93	5	20	16.9
Lines 1936	1,768	308,237	312,914	4,049	8,539	58.1	529,858	158,059	102	8	8	6.8
Texas & New Orleans 1937	4,420	684,840	685,555	10,583	15,322	55.4	1,054,614	350,038	216	40	32	11.1
1936	4,416	577,600	578,141	11,784	13,191	60.6	842,664	282,964	197	41	58	19.6
Texas & Pacific 1937	1,944	355,896	355,896	2,257	10,749	64.3	659,137	220,952	92	7	103	51.0
1936	1,945	313,740	313,740	2,098	9,515	59.9	595,556	183,636	65	54	97	44.9

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

1937, Compared with June, 1936, for Roads with Annual Operating Revenues Above $25,000,000

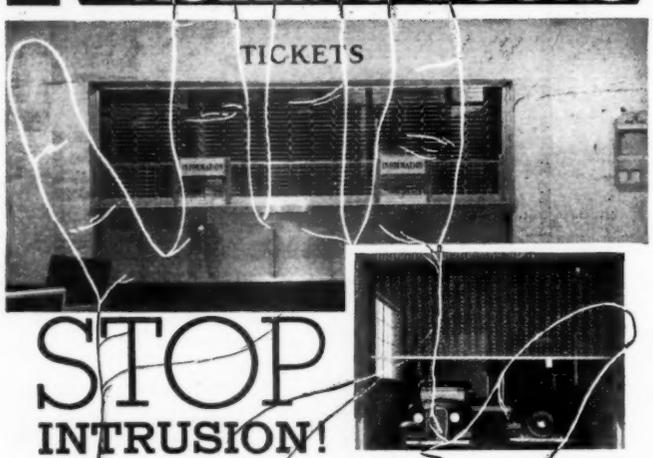
Region, road, and year	Number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross ton-miles per train-mile, excluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive-miles per locomotive-day
New England Region:													
Boston & Albany....1937	2,106	4,413	6,519	24.1	21,024	1,258	441	19.4	304	23.2	5,299	158	58.8
1936	2,395	4,510	6,905	22.5	21,540	1,310	440	17.6	263	22.1	4,792	153	52.7
Boston & Maine....1937	8,149	7,603	15,752	13.7	25,809	1,872	701	20.0	397	27.9	3,250	97	45.4
1936	8,236	7,064	15,300	16.4	25,048	1,867	690	20.0	382	27.6	3,057	100	40.8
N. Y., New H. & Hartf....1937	8,272	11,945	20,217	10.6	26,667	1,862	685	19.3	370	27.7	3,876	97	64.2
1936	13,575	10,877	24,452	17.8	25,618	1,832	660	19.5	301	23.3	3,642	102	55.2
Great Lakes Region:													
Delaware & Hudson....1937	8,312	3,878	12,190	5.6	29,747	2,118	999	28.9	624	32.8	8,856	101	44.5
1936	8,421	3,069	11,490	5.7	29,087	2,051	952	28.2	542	29.2	7,802	104	38.5
Del., Lack. & Western....1937	12,678	6,364	19,042	12.7	32,326	1,969	781	23.0	481	30.7	9,643	126	75.2
1936	13,892	6,081	19,978	17.4	31,654	1,919	740	22.9	443	29.5	8,951	125	68.3
Erie (incl. Chi. & Erie)...1937	15,520	15,402	30,922	5.0	42,679	2,582	985	23.0	698	45.8	9,743	91	60.5
1936	16,883	18,343	35,226	3.8	42,546	2,616	965	22.3	608	41.8	9,213	93	58.0
Grand Trunk Western....1937	4,675	7,191	11,866	16.2	31,616	1,620	570	20.6	423	31.6	4,847	90	73.2
1936	4,248	6,948	11,196	15.1	30,966	1,590	548	20.7	411	31.5	4,636	88	70.1
Lehigh Valley 1937	10,135	10,324	20,459	7.4	40,577	2,362	1,015	26.9	569	31.9	8,978	108	55.1
1936	11,808	8,876	20,684	7.9	36,810	2,063	852	25.4	508	30.3	8,118	114	55.8
New York Central....1937	100,253	60,804	161,057	13.7	37,533	2,193	873	26.2	491	31.3	7,388	96	77.8
1936	104,779	61,081	165,860	20.7	36,523	2,162	859	25.6	424	27.8	6,636	98	68.9
New York, Chi. & St. L...1937	6,120	7,718	13,838	3.6	37,954	2,067	770	21.9	886	61.5	7,455	85	91.2
1936	6,235	7,598	13,833	3.3	38,322	2,072	749	21.4	808	58.9	6,813	85	87.0
Pere Marquette 1937	8,028	7,037	15,065	4.8	26,626	1,628	593	23.1	459	32.6	3,340	89	89.1
1936	8,689	6,235	14,924	5.4	27,207	1,631	597	23.4	468	33.0	3,402	88	87.9
Pitts. & Lake Erie....1937	7,912	10,661	18,573	31.3	47,466	3,205	1,861	48.6	299	9.5	24,703	80	47.9
1936	14,521	11,677	26,198	39.2	47,488	3,343	1,921	48.1	183	6.0	20,200	89	40.4
Wabash 1937	11,502	8,790	20,292	7.0	36,203	1,741	597	19.6	529	40.9	4,515	101	68.7
1936	10,948	9,698	20,646	3.2	36,336	1,799	604	19.6	562	44.6	4,689	99	66.9
Central Eastern Region:													
Baltimore & Ohio....1937	57,125	28,419	85,544	11.4	28,305	2,131	963	31.0	566	29.2	7,763	130	58.0
1936	68,694	27,872	96,566	15.9	27,921	2,096	935	30.4	471	24.9	7,103	132	54.0
Central of New Jersey....1937	9,540	9,968	19,508	27.1	26,817	2,192	1,020	31.3	262	13.5	7,503	132	63.0
1936	10,963	9,648	20,611	32.5	26,522	2,232	1,021	30.7	222	11.8	6,754	141	57.4
Chicago & Eastern Ill....1937	3,041	3,384	6,425	5.4	27,976	1,494	597	23.9	538	33.8	3,790	118	62.2
1936	3,408	3,091	6,499	7.7	27,058	1,454	604	24.5	501	30.1	3,552	123	54.6
Elgin, Joliet & Eastern....1937	8,256	5,830	14,086	4.1	17,623	1,990	1,001	39.0	254	10.7	8,413	110	66.7
1936	8,066	4,586	12,652	5.6	17,481	1,962	990	37.7	228	9.6	6,795	105	49.3
Long Island 1937	404	2,928	3,332	3.4	5,505	691	264	29.8	68	4.5	619	324	42.6
1936	660	3,341	4,001	2.2	5,557	783	305	30.1	69	4.5	689	308	42.0
Pennsylvania System 1937	179,857	70,125	249,982	16.5	36,040	2,453	1,104	30.6	472	24.6	11,712	110	66.9
1936	194,143	62,082	256,225	17.4	34,335	2,369	1,035	29.4	383	20.9	9,925	111	57.3
Reading 1937	21,731	13,097	34,828	7.1	24,826	1,980	953	34.5	404	18.8	9,657	133	60.2
1936	26,134	10,447	36,581	11.0	24,909	1,973	914	33.3	322	15.9	8,098	138	49.6
Pocahontas Region:													
Chesapeake & Ohio....1937	43,542	14,352	57,894	1.6	54,013	3,682	1,972	43.6	923	37.0	17,562	69	59.5
1936	41,701	12,838	54,539	1.6	56,033	3,946	2,119	45.4	1,044	41.6	18,938	69	62.1
Norfolk & Western....1937	34,633	6,169	40,802	1.5	52,020	3,417	1,783	41.6	1,000	40.5	18,028	93	73.9
1936	32,495	5,236	37,731	1.9	49,990	3,405	1,777	43.3	979	38.3	16,948	96	67.5
Southern Region:													
Atlantic Coast Line....1937	15,564	7,882	23,446	22.1	20,910	1,193	433	19.8	338	26.8	1,690	106	58.8
1936	18,495	6,541	25,036	23.6	19,062	1,071	381	19.0	272	22.0	1,435	111	53.2
Central of Georgia....1937	3,542	4,651	8,193	2.1	21,725	1,165	452	21.0	494	32.9	2,086	120	76.3
1936	3,402	4,563	7,965	4.2	21,349	1,165	429	20.1	439	30.8	1,853	116	71.5
Illinois Central (incl. 1937	29,833	19,261	49,094	14.7	25,871	1,506	593	24.2	608	39.3	4,611	123	64.7
Y. & M. V.)....1936	36,153	19,787	55,940	28.5	25,906	1,491	580	24.2	529	35.0	4,536	121	66.7
Louisville & Nashville....1937	31,927	10,710	42,637	12.2	25,193	1,626	762	32.8	681	34.7	5,959	123	81.3
1936	36,384	10,655	47,039	23.7	25,841	1,669	789	32.8	565	28.5	5,446	120	73.5
Seaboard Air Line....1937	8,910	5,925	14,835	2.3	23,035	1,405	541	21.7	543	37.2	2,017	116	60.7
1936	9,130	4,934	14,064	2.7	22,771	1,376	497	20.2	488	36.4	1,623	114	50.0
Southern 1937	20,587	19,485	40,072	12.2	21,551	1,246	503	22.7	514	33.3	3,202	138	59.6
1936	23,108	16,604	39,712	16.8	21,089	1,228	470	20.6	470	33.3	2,856	141	54.9
Northwestern Region:													
Chi. & North Western....1937	35,388	19,128	54,516	7.3	25,509	1,684	649	23.5	348	22.9	2,286	107	53.6
1936	37,324	22,359	59,683	9.7	25,555	1,649	600	22.5	343	24.0	2,398	110	56.3
Chicago Great Western....1937	2,033	3,809	5,842	2.9	30,915	1,698	608	21.4	860	63.8	3,512	121	96.7
1936	1,766	4,019	5,785	3.0	30,139	1,850	685	21.9	900	63.3	3,489	122	95.0
Chi., Milw., St. P. & Pac..1937	41,560	20,797	62,357	2.7	27,693	1,741	695	25.2	474	30.1	2,654	112	78.0
1936	43,146	21,687	64,833	2.9	27,603	1,730	683	24.9	462	29.9	2,680	113	78.0
Chi., St. P., Minneap. & Om.1937	3,901	4,723	8,624	10.1	18,539	1,397	566	24.7	452	27.6	2,438	97	57.9
1936	2,992	5,969	8,961	9.8	18,336	1,414	567	24.2	456	27.7	2,438	107	58.7
Great Northern 1937	35,964	10,119	46,083	8.7	39,401	2,606	1,245	34.4	711	34.5	4,149	93	54.7
1936	37,357	10,448	47,805	10.9	36,854	2,415	1,111	32.0	575	29.7	3,380	97	47.7
Minneap., St. P. & S. St. M.1937	11,596	5,800	17,396	3.3	21,468	1,361	577	24.7	431	25.4	1,692	95	88.8
1936	12,555	4,712	17,267	5.5	21,988	1,390	597	25.0	429	25.0	1,697	94	82.7
Northern Pacific 1937	25,941	5,859	31,800	7.4	30,146	1,930	798	25.2	563	33.5	2,799	134	58.6
1936	27,630	5,505	33,135	10.8	28,625	1,809	743	25.2	512	30.7	2,654	139	66.1
Central Western Region:													
Alton 1937	2,552	6,136	8,688	22.6	33,352	1,402	576	26.0	475	30.2	4,474	119	83.5
1936	2,431	6,622	9,053	23.1	34,526	1,496	543	23.4	408	28.7	3,843	107	76.0
Atch., Top. & S. Fe (incl. 1937	65,426	19,739	85,165	7.4	34,485	1,882	599	21.2	521	42.1	3,160	114	92.4
G.C. & S.F. & P. & S.F.).1936	65,751	13,746	79,497	9.8	33,276	1,817	598	20.5	449	34.7	2,724	113	75.6
Chi., Burl. & Quincy....1937	25,962	19,752	45,714	6.6	27,486	1,613	677	24.2	575	36.0	2,861	113	80.3
1936	27,279	16,204	43,483	8.4	27,478	1,586	651	24.4	600	39.0	2,856	113	84.1
Chi., Rock I. & Pac. (incl. 1937	21,779	16,417	38,196	5.0	25,457	1,455	539	23.3	618	43.4	2,801	120	72.9
Chi., Rock I. & Gulf)....1936	24,503	13,592	38,095	8.8	24,709	1,390	494	21.9	526	39.1	2,422	123	60.9
Denver & R. G. Wn....1937	11,497	3,246	14,743	6.2	25,775	1,583	714	27.8	463	23.4	2,667	150	62.1
1936	12,853	3,054	15,907	7.9	26,210	1,621	682	25.6	357	20.4	2,199	153	52.9
Southern Pacific—Pacific 1937	33,034	34,593	67,627	6.3	33,035	2,062	671	20.7	559	43.8	4,328	101	93.4
Lines 1936	32,328	27,206	59,534	8.3	33,691	2,078	655	20.0	543	44.1	3,759	99	81.8
Union Pacific 1937	37,700	18,932	56,632	11.1	40,445	1,939	721	22.1	683	45.7	3,901	115	70.6
1936	40,089	17,032	57,121	13.2	40,204	1,970	717	21.6	613	41.9	3,565	113	64.5
Southwestern Region:													
Mo.-Kans.-Texas Lines 1937	3,904	7,674	11,578	1.9	30,340	1,673	610	22.5	826	59.2	2,730	81	80.6
1936	4,935	5,596	10,531	6.3	31,514	1,713	574	20.8	724	58.5	2,249	80	70.2
Missouri Pacific 1937	16,216	27,050	43,266	2.4	30,279	1,732	663	23.5	603	40.5	3,478	111	79.6
1936	16,718	24,113	40,831	3.0	30,952	1,756	661	23.7	648	43.9	3,438	111	79.4
St. Louis-San Francisco...1937	16,914	8,249	25,163	6.1	25,502	1,319	519	25.3	581	38.3	2,889	120	72.7
1936	18,278	7,696	25,974	7.0	24,963	1,287	507	23.9	472	30.8	2,476	122	61.7
St. Louis Southwestern 1937	2,359	3,862	6,221	3.1	28,977	1,504	447	19.0	871	82.2	3,201	90	110.5
Lines 1936	2,860	3,993	6,853	3.9	31,777	1,723	514	18.5	764	71.0	2,981	85	92.6
Texas & New Orleans....1937	6,570	13,533	20,103	6.4	28,735	1,549	514	22.8	562	44.5	2,640	84	85.1
1936	7,331	11,803	19,134	7.8	26,700	1,470	494	21.5	489	37.7	2,136	85	70.3
Texas & Pacific....1937	2,149	6,578	8,727	1.9	33,938	1,858	623	20.6	851	64.4	3,789	80	63.3
1936	2,638	5,478	8,116	3.7	32,477	1,902	587	19.3	776	67.2	3,146	82	52.6

OKONITE V.C. CABLES

are of the same excellent quality that has distinguished OKONITE Rubber Insulated Cables for over half a century.

THE OKONITE COMPANY
Founded 1878
HAZARD INSULATED WIRE WORKS DIVISION
THE OKONITE-CALLENDER CABLE COMPANY, INC.
EXECUTIVE OFFICE: PASSAIC, N. J.
New York Boston Seattle Buffalo Detroit St. Louis Philadelphia
Atlanta Los Angeles Pittsburgh Chicago Washington Dallas San Francisco
Factories: Passaic, N. J. Wilkes-Barre, Pa. Paterson, N. J.

KINNEAR ROLLING DOORS

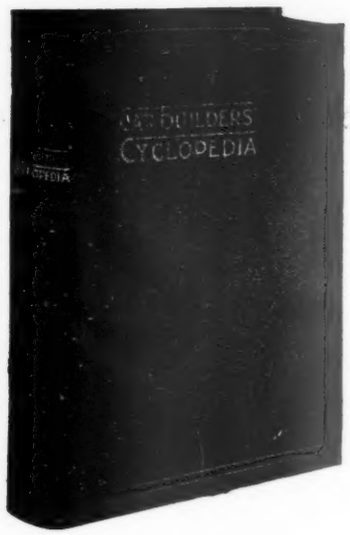


STOP INTRUSION!

Protect Railway openings with Kinnear Rolling Grilles. A remarkably strong barricade against burglary or trespassing! They permit the admission of air, light and vision. Coiling out of sight . . . easy to operate . . . and attractively built of Steel, Stainless Steel, Bronze or Aluminum, they are equally suitable for inside or outside installations in old or new buildings. Write for details.

THE KINNEAR MFG. CO.
2020-40 FIELDS AVE., COLUMBUS, OHIO

Now Going to Press



The Fourteenth Edition of the Car Builders' Cyclopedia will include the remarkable developments which have characterized recent design of passenger and freight car equipment. A few of the many new features in this new edition are light-weight streamlined passenger cars, Diesel-electric trains, light-weight freight cars, air-conditioned passenger cars, improved car trucks, lubrications, and roller bearing equipment.

CONTENTS

Dictionary of Terms—Freight Train Cars—Freight Car Construction Details—Railway Service Cars—Passenger Train Cars—Motor Trains and Diesel-Cars—Passenger Car Construction and Equipment—Passenger Train Lighting—Air Conditioning, Heating and Ventilation—Car Trucks, Lubrication and Roller Bearings—Draft Gears, Couplers; Buffers—Air Brakes and Signals—Brake Gear—Safety Appliances—Car Shops, Maintenance and Repairs—Car Inspection; Interchange; Loading—Car Materials—Industrial and Mine Cars—Foreign Cars—Indexes.

1350 pages, 3800 illus., 9 x 12 inches, buckram, $5.00; leather, $7.00

Sent on Ten Days' Approval

ON APPROVAL ORDER CARD

Simmons-Boardman Publishing Corporation
30 Church Street, New York, N. Y.

Reserve me a copy of the Fourteenth Edition of the CAR BUILDERS' CYCLOPEDIA. As soon as off the press send postpaid on Ten Days' Free Examination. I satisfactory I will remit list price. Otherwise I will return the book without obligation. I am checking the binding I prefer. ( ) Buckram, $5.00 ( ) Leather, $7.00

Name.....

Street.....

City.....*State*.....

Company.....*Position*.....

This offer is limited to retail purchasers in the United States and Canada
R.A. 8-28-37